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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	501.34746CX1
Total Pages	
First Named Inventor or Application Identifier	N. TOMOYUKI et al.
Express Mail Label No.	

JC408 U.S. PTO 09/425312 10/25/99

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] Fee: $760.00

[X] Please enter the Preliminary Amendment including the cancellation of original claims 1-9 and 11-18 and substitution of new claims _____ before calculation of the filing fee.

[X] Please charge any shortages in the fees or credit any over-payments thereof to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135.

2. [X] Specification [Total Pages 54]

3. [X] Drawing(s) (35 USC 113) [Total Sheets 12]

4. Oath or Declaration [Total Pages 66]

a. [ ] Newly executed (original or copy)

b. [X] Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 17 completed) [Note Box 5 below]

i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

5. [X] Incorporation By Reference (useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program (Appendix)

7. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)

a. [ ] Computer Readable Copy

b. [ ] Paper Copy (identical to computer copy)

c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & document(s))

9. [ ] 37 CFR 3.73(b) Statement (when there is an assignee) [ ] Power of Attorney

10. [ ] English Translation Document (if applicable)

11. [X] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations

12. [ ] Preliminary Amendment

13. [X] Return Receipt Postcard (MPEP 503) (Should be specifically itemized)

14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, Status still proper and desired

15. [ ] Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. [ ] Other: .....

.....

.....

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

[X] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: 08/690,358

18. CORRESPONDENCE ADDRESS

[XX] Customer Number or Bar Code Label 020457

(Insert Customer No. or Attach bar code label here)

11. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	N. TOMOYUKI et al
Application No.:	Continuation of 08/690,358
Filing Date:	October 22, 1999
Title:	ELECTRONIC PURSE LOAN SYSTEM
Art Unit:	2765 (Anticipated)
Examiner:	J. Patel (Anticipated)

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

October 25, 1999

Sir:

The following preliminary amendments and remarks application are respectfully submitted in connection with the above-identified application.

IN THE ABSTRACT OF THE DISCLOSURE:

Line 2, delete "sum of the" and insert --amount of a --;

line 3, delete "the others are" and insert --is--;

line 4, delete "to" and insert --in--;

line 6, delete "the next" and insert --a current--;

same line 6, delete "sum" and insert --amount--;

line 8, delete "sum" and insert --balance--;

line 10, after "the" insert --current--;

line 12, delete "comes" and insert --is carried out,--;

line 13, delete "into effect";

line 15, delete "having" and insert --obtaining--;

same line 15, delete "sum" and insert --amount--;

line 17, delete "As described above" and insert --Thus--;

line 18, delete "the" and insert --a--;

same line 18, delete "of a" and insert --in the--;

same line 18, after "balance" insert --carried by the IC card--;

line 19, after "for" insert --a--; and

same line 19, delete "to" and insert --in--.

IN THE SPECIFICATION:

Please replace the original specification with the attached Substitute Specification.

IN THE CLAIMS

Please cancel claims 1-9 and 11-18 without prejudice or disclaimer and amend claim 10 as follows:

10. (amended) An electronic purse loan system, comprising:

an IC card provided with a storage for storing an ID number [for storing] and electronic money information including the amount of a balance; and

a terminal comprising [an] IC card reading/writing means for reading information stored in said IC card [or] and writing information to said IC card, [an] input means for

inputting a numeric value and [others] other information, [a] personal information storage means for storing the ID [number] numbers of [said] IC [card and the] cards in correspondence with information of [the sum] a loan amount and [a collation] correlation means for [collating with] correlating the ID number [and] of said IC card with the ID numbers stored in said personal information storage means to access the information of [the sum] a loan amount stored in said personal information storage means[,]; wherein:

when [the] a payment [of] for a commercial transaction is made, said terminal subtracts [electronic money information] an amount equivalent to the [sum] amount to be paid for said commercial transaction from [data] the amount of the balance stored in said IC card using said IC card reading/writing means.

REMARKS

The Abstract of the Disclosure has been amended to correct errors of a typographical and grammatical nature.

The specification has been amended to correct errors of a typographical and grammatical nature. Due to the excessive corrections thereto, Applicants submit herewith a Substitute Specification. Applicants submit that the substitute specification includes no new matter. Therefore, entry of the Substitute Specification is respectfully requested.

The claims have been amended to cancel the claims allowed in the parent application and to amend remaining claim 10 in the same manner as the parent application.

Entry of the preliminary amendments and examination of the application is respectfully requested.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this Preliminary Amendment, including extension of time fees and excess claim fees, to Deposit Account No. 01-2135 (referencing Docket No. 34746CX1) and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

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SUBSTITUTE SPECIFICATION

Title of the Invention

Electronic Purse Loan System

Background of the Invention

The present invention relates to an electronic purse loan system or POS terminal for storing loan data relating to a shortage in the amount of a payment to a center and for effecting a processing to clear off a loan amount in the next transaction when a commercial transaction is performed using the electronic purse loan system or POS terminal.

If a commercial transaction is performed using a prepaid card of the type which is in widespread use at the present time, such as a telephone card, the above-described system operates to inhibit a commercial transaction involving use of the card at that time when the total consumed amount reaches or exceeds the sum stored in the card.

In addition, an electronic purse system has been developed in which a transaction is performed by recording information concerning the charges for transaction in an IC card, for example; however, in such an electronic purse system, a transaction may be performed only to the extent of the sum payable from an electronic purse, as described in Japanese published unexamined patent application No. H3-92966. That is, if the balance stored in the IC card is

less than the amount of the transaction, the user of the electronic purse is informed that the balance is short and is urged to select whether the transaction is to be stopped, the amount to be paid using the IC card is to be changed or another transaction method, such as a regular credit card, is to be used to perform a flexible transaction.

Since the above-described prepaid card is usable only for payment for a specific service, a card for the amount of money corresponding to the service is prepared beforehand. Therefore, there are few occasions on which the balance is short. However, in the above-described electronic purse system, there is a great possibility that a shortage in the balance will occur at the time of payment due to the user forgetting to pay into his own electronic purse, and the shortage of a required amount to be paid for a transaction occurs because an electronic purse is utilized in many diverse fields. Therefore, in an electronic purse system, the balance in an IC card can be checked at any time using a portable balance display and other means, however, if the balance is short at the time of a transaction, the transaction using the electronic purse is not permitted.

Objects of the Invention

The object of the present invention is to provide an electronic purse system in which a transaction is not prevented due to a shortage in the balance held in the IC card even if the user of the electronic purse system forgets to pay into his account for his or her IC card or even

during a time of sharing service. Another object of the present invention is to enable correspondence only by the electronic purse system without using another transaction method, such as cash and a credit card, as required heretofore, as a method of avoiding the suspension of a transaction.

Summary of the Invention

To achieve the above-described objects, an electronic purse loan system according to the present invention comprises an IC card provided with a storage for storing an ID number and electronic money information, an IC card reading/writing unit for reading information from the IC card or writing information to the IC card, an input device for inputting a numeric value, an electronic purse terminal provided with a communication control unit for sending or receiving data via a public telephone network, a personal information storage for storing the ID number of the IC card and the information of a loan sum, a correlating device for correlating the ID number of an IC card and the information of the loan sum stored in the personal information storing means, a data bank for storing data, such as a movie, and an information center provided with a communication control unit for sending or receiving data from the data bank via the public telephone network.

If the balance indicated by the electronic money information of an IC card is less than the amount of a charge when the data stored in the data bank is read, the

processing for a loan is performed by storing the total or a part of the charge in the personal information storing means as information of a loan sum, only if its ID number is verified by correlating the ID number read from the IC card using the correlating device and the user indicates a desire for a loan via the input means.

Therefore, if the shortage in the balance carried by an IC card occurs at the time of payment using the electronic purse system, the processing for a loan can be immediately performed by storing the sum of a loan in the center or a POS terminal as information for a person whose ID number is cataloged, and the suspension of a transaction or the need to change to another transaction method, such as cash and a credit card, can be avoided. Heretofore, if the shortage in the balance carried by an IC card occurred at the time of payment, the transaction was stopped or payment by another transaction method, such as cash and a credit card, was required; however, according to the present invention, the processing for a loan can be immediately performed by the electronic purse system by storing information indicating the sum of a loan in the center or a POS terminal as information for a person whose ID number is cataloged, thereby adding a function for a loan to the electronic purse system, so that suspension of the transaction, or a change to another transaction method, can be avoided and a perfect cashless commercial transaction using only the electronic purse system can be realized.

Brief Description of the Drawings

The features of the present invention will be more apparent from the following detailed description, when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram showing an embodiment of an electronic purse loan system according to the present invention.

Figs. 2(a) and 2(b) are diagrams of examples of a personal information storage in the electronic purse loan system shown in Fig. 1.

Fig. 3 is a flowchart showing a concrete example of the basic operation in the electronic purse loan system shown in Fig. 1.

Fig. 4 is a flowchart showing another concrete example of the basic operation in the electronic purse loan system shown in Fig. 1.

Fig. 5 is a diagram which shows another example of the personal information storage in the electronic purse loan system shown in Fig. 1.

Fig. 6 is a flowchart showing a further example of the basic operation in the electronic purse loan system shown in Fig. 1.

Fig. 7 is a block diagram showing a second embodiment of an electronic purse loan system according to the present invention.

Fig. 8 is a flowchart showing example of the basic operation in the electronic purse loan system shown in Fig.

7.

Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention.

Fig. 10 is a diagram which shows a concrete example of a personal information storage in the electronic purse loan system shown in Fig. 9.

Fig. 11 is a flowchart showing an example of the basic operation in the electronic purse loan system shown in Fig. 9.

Fig. 12 is a flowchart showing the operation at the time of entraining and detraining in the flowchart shown in Fig. 11.

Fig. 13 is a block diagram showing another example of an IC card in the electronic purse loan system according to the present invention.

Detailed Description of Preferred Embodiments

Various embodiments according to the present invention will be described below with reference to the drawings.

Fig. 1 is a block diagram showing a first embodiment of an electronic purse loan system according to the present invention, including an IC card 1, an electronic purse terminal 2, a center 3, a monitor 4, and a setting top box 5. The IC card includes an ID number storage 11, a processor 12, a connection 13, and a sum information storage 14. The electronic purse 2 includes a display 21, an input unit 22, a card controller 23, a card reader/writer 24, a

processor 25, and a communication control unit 26. The center 3 includes a communication control unit 31, a processor 32, a sales storage 33, a personal information storage 34, a data converter 35, a movie bank 36, a news bank 37 and a sports bank 38. The setting top box 5 includes a data converter 51, a setting top box input unit 52, a communication control unit 53 and a processor 54.

Figs. 2(a) and 2(b) represent examples of the personal information storage 34 shown in Fig. 1. A reference number 60 denotes an ID number storage, 61 denotes a loan storage and 62 denotes a loan date storage. The example shown in Fig. 2(a) is for a case where a loan is given one ID number, and the example shown in Fig. 2(b) is for a case where a loan is given a plurality of ID numbers. The latter is for a group, such as a family.

Fig. 3 is a flowchart showing an example of the basic processing carried out by this embodiment.

In this embodiment, service data, such as a movie, news and a sports event is read from the center via a telecommunication line, such as a public telephone network, and the charge for the service is paid using an electronic purse system.

The constitution and the processing shown in Figs. 1 and 3 are based on the premise that the owner of an IC card 1 should pay the charge for a movie by electronic money transfer. The system in this embodiment is placed in a state where it is waiting for the input of an IC card 1 to

be inserted into a slot of the electronic purse terminal 2, and, when that occurs, a message to that effect is displayed on the display 21 of the electronic purse terminal 2 as a result of the processing in a step S102.

When the user inserts his/her IC card into the slot of the electronic purse terminal 2, the IC card movement is controlled by the card controller 23 of the electronic purse terminal 2, so that the connection 13 of the IC card 1 is connected to the card reader/writer 24 of the electronic purse terminal 2, and the electronic purse terminal 2 verifies that an IC card 1 has been inserted, in a step S103.

When it is verified that an IC card 1 has been inserted, it is first checked to determine whether the owner of the IC card 1 is a cataloged member of the center 3. For that purpose, an ID number proper to the IC card, as stored in the ID number storage 11 of the IC card 1, is read by the card reader/writer 24 in the electronic purse terminal 2 in a step S104, and after this data is processed in the processor 25, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. The cataloged ID numbers are read from the ID number storage 60 shown in Fig. 2(a) in the personal information storage 34 in the center 3 in a step S105, and the ID number stored in the IC card 1 is correlated with the cataloged ID numbers to determine

whether the ID number stored in the IC card 1 is cataloged in the center 3 in a step S106. When it is verified that the ID number stored in the IC card identifies a cataloged member, a function for obtaining a loan is usable; however, if the ID number stored in the IC card does not identify a cataloged member, the function for obtaining a loan cannot be used, and only a normal transaction using electronic money transfer is allowed, and processing proceeds to a step S114.

If the function for obtaining a loan at the center 3 is used to pay the charge for the last service on behalf of the cataloged member, the member cannot receive the next service until the charge for the last service has been cleared off by the member. Therefore, the contents of information for this member as stored in the personal information storage 34 in the center 3 are referred to in a step S107, and it is checked to determine whether a loan exists in connection with the last transaction in a step S108. As a result, if no loan exists, processing proceeds to the step S114 for a normal procedure for payment.

If it is verified in the step S108 that a loan still exists, the sum of the current loan is displayed on the display 21 of the electronic purse terminal 2, a message which urges the member to select whether the loan is to be cleared off is also displayed, and the owner of the IC card 1 selects either choice via the input unit 22 of the electronic purse terminal 2 in a step S109. If clearing of

the loan is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 23 in the electronic purse terminal 2 in a step S110 and is compared with the loan amount stored in the loan amount storage 61 shown in Fig. 2 in the personal information storage 34 in the center 3 by the processor 32 in a step S111.

If the balance carried by the IC card is more than the loan amount, the loan amount is subtracted from the balance by the processor 32 and a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 24 in a step S112. The loan amount storage 61 and the loan date storage 62, respectively, shown in Fig. 2(a) in the personal information storage 34 in the center 3 are updated in a step S113.

Clearing off of the loan undertaken in the last transaction is completed by the above-described steps and processing proceeds to the procedure for the next service. If the loan is not cleared off in the step S109, or if the balance is indicated as being short in the step S111, the next service cannot be received, the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S129 and the processing is ended in a step S130.

If it is found that the owner of the IC card is not a cataloged member in the step S106, or that no loan exists in the step S108 even if the owner is a cataloged member, when

processing proceeds as far as the above-described step S113, first the identification of a variety of services, such as a movie, news and a sports event, which this system can provide are displayed on the monitor 4 and the user can select his/her desired service on the input unit 52 of the setting top box 5. For example, when a movie is selected, the titles of movies and the charge therefor are displayed in a step S114, and the user selects the title of his/her desired movie on the input unit 52 in a step S115.

When a title has been selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 and is compared with the charge for this selected movie by the processor 32 of the center 3 in a step S116. As a result, if the balance is more than or equal to the charge, the charge is subtracted from the balance by the processor 32 in a step S117, the amount is added to the sales storage 33 in a step S118, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 and the payment for the charge is completed in a step S119.

Then, the data for the movie selected from the movie bank 36 is read and converted by the data converter 35, and the video is sent to the processor 32 of the center 3 and is transferred to the setting top box 5 via the communication control unit 31. The data is fetched in the setting top box 5 via the communication control unit 53, movie data is converted by the data converter 51 in a step S125 and the

movie is presented on the monitor 4 in a step S126.

If the balance is found to be less than the charge for the selected movie in the step S116, a message showing that the balance carried by the IC card is short is displayed on the display 21 of the electronic purse terminal 2 in a step S120. And, it is checked again to determine whether the ID number of the user of the IC card 1 is cataloged or not in a step S121; and, as a result, when it is verified that the user is a cataloged member, a message which urges the user to select whether he/she would like to have a loan is displayed on the display 21 and the user is urged to select either choice in a step S122.

If the user indicates a desire to have a loan on the electronic purse input unit 22 in the step S122, the charge is added to the sales storage 33 in the center 3 in a step S123, the amount of the loan is stored in the loan amount storage 61 shown in Fig. 2 and the loan date is stored in the loan date storage 62 shown in Fig. 2(a), respectively, in the personal information storage 34 in a step S124. In this case, the total charge is processed as the amount of the loan. Payment is effected by this procedure and the presentation of the desired movie is started in steps S125 and S126.

If the user is found to be not a cataloged member in the step S121, or if the user elects not to have a loan on the electronic purse input unit 22 in the step S122, even if he/she is a cataloged member, the user cannot receive the

selected movie and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S129.

When the movie is finished, a message which urges the user to indicate whether the service is to be terminated or another movie is to be selected is displayed on the monitor 4 in a step S127. When the user selects another movie on the input unit 52 of the setting top box 5, processing is returned to a state in which the titles of the movies and the charge therefor are displayed on the monitor 4 in the step S114, and if the user pays the charge, he/she can enjoy another movie.

When the user elects to end the service on the setting top box input unit 52 in the step S127, the service is terminated in a step S128 and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S129.

An IC card 1 may be provided with a loan sum storage to correlate the data of a loan amount read from each IC card by the card reader/writer 24 with the data stored in the center 3. The total charge may be loaned or the amount in which the balance is short may be loaned. In the latter case, the balance stored in the sum information storage 14 of an IC card 1 is required to be updated.

In the above-described embodiment, in case a plurality of ID numbers in a family are grouped in the personal information storage 34, as shown in Fig. 2(b), and are

stored in the center 3 as group information, a member of the group can clear off the loan given to another member. Therefore, the charge for the movies enjoyed by a child can be paid for by his/her parent in a lump sum.

In the above-described embodiment, the electronic purse terminal 2 and the setting top box 5 are separate, however, the electronic purse system may be built into the setting top box.

Next, the processing in this embodiment for a case wherein the term for repayment is determined will be described. Fig. 4 is a flowchart showing the basic processing for payment in accordance with this embodiment in which the term for repayment is determined for a loan.

As shown in Figs. 1 and 4, when an IC card 1 is inserted into the slot of an electronic purse terminal 2, which is in the state of waiting for an input in steps S202 and S203 if the owner of the IC card 1 pays the charge for a service by electronic money transfer, the IC card 1 is inserted by the card controller 23 in the electronic purse terminal 2 and the connection 13 provides for connection of the IC card 1 to the card reader/writer 24.

The electronic purse terminal 2 verifies that the IC card 1 has been inserted in the step S203 and first checks to determine whether the owner of this IC card 1 is a cataloged member of the center 3.

That is, the ID number proper to this IC card, as stored in the ID number storage 11 of the IC card 1, is read

by the card reader/writer 24 in a step S204, and, after it is processed in a processor 25 in the electronic purse terminal 2, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. The cataloged ID numbers are read from an ID number storage 60 shown in Fig. 2(a) in a personal information storage 34 in the center 3 in a step S205, and it is checked to determine whether the ID number is cataloged in the center 3 by correlating the ID number read from the IC card 1 with the cataloged ID numbers from the personal information storage 34 in a step S206. If the ID number is cataloged in the center 3, a loan is permissible, however, if it is not a cataloged member, a loan cannot be obtained, and only a normal transaction is enabled and processing proceeds to a step S214.

If the charge for the last service is paid utilizing a loan from the center 3 when the ID number is found to belong to a cataloged member, clearing of a prior loan is required; however, in this embodiment, if the date of the transaction is within the period prior to the date that the loan is to be repaid, a further loan can be given, even if the above-described prior loan is not cleared off.

In a step S207, the user's former transactions are checked referring to the contents of a loan date storage 62 shown in Fig. 2 in the personal information storage 34 in the center 3, and, as a result, if the user has no existing

loan in a step S208, processing proceeds to the step S214 for a normal procedure.

If it is determined that the user has an existing loan relating to the last charge in the step S208, the sum of the former loan is displayed on the display 21 of the electronic purse terminal 2 and the user is urged to select whether he/she intends to clear off the loan in a step S209. If the balance stored in the sum information storage 14 of the IC card 1 is more than the loan, the loan can be cleared off; however, if the balance is short or if clearing is not required, the user can refuse to pay off the loan. In this case, processing proceeds to the step S214.

If clearing of the loan is selected in the step S209, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 of the electronic purse terminal 2 in a step S210 and is compared with the sum of the loan stored in the loan amount storage 61 shown in Fig. 2(a) in the personal information storage 34 in the center 3 by the processor 32 in a step S211. If the balance carried by the IC card is more than the amount of the loan, the loan amount is subtracted from the balance by the processor 32, a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 24 of the electronic purse terminal 2 in the step S212 and the amount of the loan stored in the loan amount storage 61 shown in Fig. 2 and the loan date stored in the loan date storage 62 shown in Fig. 2(a),

respectively, in the personal information storage 34 in the center 3 are reset in the step S213.

Clearing of the former transaction is completed by the above-described steps and processing proceeds to a procedure for the current service. If the former loan is not cleared off in the step S209 or if the balance is short in the step S211, a new service still may be provided without clearing off the loan.

In this regard, the contents of services and the charge are displayed on the monitor 4 in the step S214 and the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S215.

When a service has been selected, as described above, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 and sent to the processor 32 of the center 3 where the balance is compared with the charge for the service in a step S216. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S217 and is added to the sales storage 33 by the processor 32 in a step S218. The balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 of the electronic purse terminal 2 in a step S219.

Hereby, payment is completed, the data is transferred to the setting top box 5 in a step S228 and service is started in a step S229.

If the balance is determined to be less than the charge in the step S216, the shortfall is displayed on the display 21 of the electronic purse terminal 2 in a step S220. The ID number is referred to again and it is checked to determine whether the number is assigned to a cataloged member in a step S221. As a result, if the ID number is assigned to a cataloged member, a message which urges the user to select whether the user would like to take out a loan is displayed on the display 21 of the electronic purse terminal 2 in a step S222.

If the user indicates the desire for a loan on the input unit 22 of the electronic purse terminal 2 in a step S222, data stored in the loan date storage 62 shown in Fig. 2 in the personal information storage 34 in the center 3 is read to check whether the user has an existing loan in a step S223, and if the user has no loan at present, processing proceeds to a step S225 so as to give the user a loan immediately.

If the user is given a loan in the step S223 and the date is within the term of repayment set by the center 3, for example the 28th of every month in a step S224, the charge is added to the sales storage 33 by the processor 32 of the center 3 in a step S225, and the loan amount storage 61 and the loan date storage 62, shown in Fig. 2(a), in the personal information storage 34 are updated in a step S226.

Payment by loan is completed by this procedure, processing proceeds to the step S228 and service is started

in the step S228.

In this case, the total charge may be loaned or only the shortfall may be loaned.

If the term for repayment is over, a message informing the user that the term for repayment is over is displayed on the display 21 of the electronic purse terminal 2 in a step S227, and the user cannot receive service as a non-cataloged member or a user who selects that he/she has no current loan on the input unit 22 of the electronic purse terminal 2, with a result that the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S232.

When the service is completed, a message which urges the user to select whether service is to be ended or a new service is to be provided is displayed on the monitor 4 in a step S230. If the user indicates that he/she would like to receive a new service on the input unit 52 of the setting top box 5, processing is returned to the state in which the contents of services and the charge are displayed on the monitor 4 in the step S214, and when payment is made, the user can receive a new service.

If the user indicates that service is to be ended on the input unit 52 of the setting top box 5 in the step S230, service is terminated in the step S231 and the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S232. Thus, a series of processings is completed in a step S233.

In this embodiment, repayment may be set for payment in monthly installments and charges can be loaned many times within the term for repayment, however, a repayment term storage may be provided in the personal information storage 34 in the center 3, and it may be set so that charges can be loaned many times within the term for repayment set according to the number of days from the day of the first loan.

Next, the processing in this embodiment in the case where the upper limit of a loan is determined will be described.

Fig. 5 shows an example of the personal information storage 34 in Fig. 1 in which the upper limit of a loan is stored. In Fig. 5, a reference number 60 denotes the ID number storage, 71 denotes a loan upper limit storage, 61 denotes the loan amount storage and 62 denotes the loan date storage.

Fig. 6 is a flowchart showing the basic processing when payment is made in accordance with this embodiment provided with a function for giving a loan, the upper limit of which is determined, the upper limit of the loan being stored in the loan upper limit storage 71 in the personal information storage 34 shown in Fig. 5.

In this case, the processing shown in the steps S201 to S213 in Fig. 4 is also used in this embodiment, whereby the loan in the former transaction is cleared off, and after the contents of services and the charge are displayed on the

monitor 4 in a step S301, the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S302.

When the service is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 in the electronic purse terminal 2 and sent to the processor 32 of the center 3 to compare the balance with the charge in a step S303. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S304, and the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 in a step S305. The charge is added to the sales storage 33 by the processor 32 in a step S306.

Thus, payment is completed, the data of the selected service is transferred to the setting top box 5 in a step S315 and service is started in a step S316.

If the balance is determined to be less than the charge in the step S303, a message showing that the balance carried by the IC card is short is displayed on the display 21 of the electronic purse terminal 2 in a step S307. A check is again made to determine whether the user is a cataloged member in a step S308, and, if it is verified that the user is a cataloged member, a message which urges the user to select whether he/she desires a loan is displayed on the display 21 of the electronic purse terminal 2 in a step S309.

If the user indicates that he/she elects to obtain a loan through the input unit 22 of the electronic purse terminal 2, the charge for the service is added to the present sum of the current loan stored in the loan amount storage 61 shown in Fig. 5 in the personal information storage 34 in the center 3 and a new sum for the loan is calculated in a step S310. This new sum for the loan and the upper limit of the loan stored in the loan upper limit storage 71, shown in Fig. 5, in the personal information storage 34 are compared by the processor 32 of the center 3 in a step S311, and, as a result, if the loan is less than the upper limit, the charge for the service is added to the sales storage 33 by the processor 32 in a step S312. The amount of the loan stored in the loan amount storage 61, shown in Fig. 5, in the personal information storage 34 in the center 3 is updated in a step S313.

Payment is completed by the above-described procedure and service is started in the step S315.

If it is determined that the user is not a cataloged member in the step S308, or if the user indicates that he/she does not desire a loan through the input unit 22 in the step S309 even if he/she is a cataloged member, he/she cannot receive service and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S319.

If the user's loan exceeds the upper limit in the step S311, a message showing that his/her loan exceeds the upper

limit is displayed on the display 21 of the electronic purse terminal 2 in the step S314, and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S319.

When service is completed, a message which urges the user to select whether service is to be terminated or whether a new service is to be provided is displayed on the monitor 4 in the step S317. When the user indicates the desire to receive a new service through the input unit 52 of the setting top box 5, processing is returned to a state in which the contents of services and the charge are displayed on the monitor 4 in the step S301, and when payment has been made, the user can receive the service.

If the user elects to end service through the input unit 52 of the setting top box 5, service is terminated in the step S318 and the user's IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S319. Thus, a series of processings is completed in a step S320.

In this embodiment, the upper limit of a loan can be arbitrarily set by providing the loan upper limit storage 71, as shown in Fig. 5, in the personal information storage 34; however, if the upper limit for all loans from the center is set to be equal to the same amount, the need for this loan upper limit storage 71 can be avoided.

A storage for storing the term of repayment and the number of times a loan is given may be provided in the

personal information storage 34 in addition to the upper limit loan information to adjust the sum of a loan.

In this embodiment, the total charge is paid by loan, however, if the user does not want to pay the total charge by loan, only the shortfall of the balance may be paid by loan.

The electronic purse loan system, in a case where data from the center, such as a movie, is received via the setting top box has been described above; however, a case where the contents of a game are received via the setting top box may be also considered. In this case, the charge may be required for every game independent of the time, or the charge may be applied for a fixed time period in which games are provided. In the former system, a function for giving a loan can be utilized at the time of clearing, as in the case of a movie. In the latter system, clearing is automatically performed for every fixed time period in which games are provided and only if the balance stored in an IC card is short will a game be temporarily suspended and a function for obtaining a loan be executed.

As described above, even if the balance stored in an IC card is short, when a game is provided based upon payment for a fixed time period of use, the game can be continued owing to the granting of a loan.

Next, an embodiment in case the present invention is used for a POS (point-of-sale) register terminal in a supermarket and other such applications will be described.

Fig. 7 is a block diagram showing a second embodiment of an electronic purse loan system according to the present invention for use as a POS terminal. The POS terminal 8 includes a display 81, a POS register keyboard input unit 82, a card controller 83, a card reader/writer 84, a processor 85, a communication control unit 86, a sales storage 87, and a personal information storage 88. The IC card 1 has the same elements, as in the embodiment shown in Fig. 1.

Fig. 8 is a flowchart showing an example of the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot of the POS terminal 8, which is in a state waiting for an input in steps S402 and S403 to pay the charge for a service or goods by electronic money transfer, it is verified in a step S403 that the IC card 1 has been inserted.

When it is verified that the IC card 1 has been inserted, it is first checked to determine whether the owner of the IC card 1 is a cataloged member eligible for use of the POS terminal 8.

Therefore, the ID number of the IC card, as stored in the ID number storage 11 of the IC card 1, is read by the card reader/writer 84 in the POS terminal 8 in a step S404 and is supplied to the processor 85 of the POS terminal 8. Next, the cataloged ID numbers are read from an ID number storage 60 in the personal information storage 88 (provided

with the same constitution as the personal information storage 34 shown in Fig. 2(a) in this embodiment) in the POS terminal 8 in a step S405, and the ID number read from the IC card is correlated with the stored ID numbers to determine whether the ID number of the IC card is cataloged in the POS terminal 8 in a step S406.

Hereby, if it is verified that the ID number of the IC card is cataloged, payment by the loan system is enabled; however, if the ID number is not cataloged, the owner of the IC card cannot utilize the loan system, and only a normal transaction by electronic money transfer or standard credit card is enabled, and processing proceeds to a step S414.

Unless a cataloged member has paid the charge for the last service in which the loan function of the POS terminal 8 was utilized, he/she cannot receive this service without clearing the existing loan. Therefore, the last transaction is checked in a step S408 by referring to the information stored in a loan amount storage 61 and a loan date storage 62 shown in Fig. 2(a) in the personal information storage 88 in the POS terminal 8 in a step S407. As a result, if the owner has no loan, processing proceeds to a step S414 for normal payment.

If it is verified in the step S408 that the owner has a current loan, the sum of the loan is displayed on the display 81 of the POS terminal 8, a message which urges the owner of the IC card 1 to select whether the loan is to be cleared off is displayed there and he/she selects either

choice on the POS register keyboard input unit 82 in a step S409. If the owner elects to clear the loan, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 in the POS terminal 8 in a step S410 and is compared with the sum of the loan stored in the loan amount storage 61 in the personal information storage 88 by the processor 85 in a step S411.

If the balance carried by the IC card is more than the sum of the loan, the sum of the loan is subtracted from the balance by the processor 85 and a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 84 in a step S412. The loan amount storage 61 and the loan date storage 62 in the personal information storage 88 in the POS terminal 8 are reset in a step S413.

Clearing off a loan relating to the last transaction is completed by the above-described procedure and a procedure for providing the current service or goods is started. If a loan is not cleared off in the step S409 or it is found that the balance is short in the step S411, the owner cannot receive service, his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in a step S426 and the processing is terminated in a step S427.

If it is found that the owner is not a cataloged member in the step S406, or if he/she has no loan even if he/she is a cataloged member, when processing proceeds to the above-described step S413, first the contents of this

service and the charge are displayed on the display 81 of the POS terminal 8 in the step S414. The balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 and is compared with the charge for the service or goods by the processor 85 in a step S415. As a result, if the balance carried by the IC card is more than or equal to the charge, the charge is subtracted from the balance by the processor 85 in a step S416, the charge is added to the sales storage 87 in a step S417, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 84 in a step S418, a message showing the completion of payment is displayed on the display 81 of the POS terminal 8 in a step S424 and the payment process is completed in a step S425.

If it is found that the balance stored in the IC card 1 is less than the charge for the service or goods in a step S421, a message showing the balance is short is displayed on the display 81 of the POS terminal 8 in a step S419. It is checked again to determine whether the ID number of the IC card 1 is that of a cataloged member in a step 420. As a result, if the ID number is for a cataloged member, a message which urges the owner to indicate whether he/she desires a loan is displayed on the display 81 in the step S421.

If the owner selects to obtain a loan on the POS register input unit 82 in the step S421, the charge is added to the sales storage 87 in the POS terminal 8 in a step

S422, the sum of the loan is stored in the loan amount storage 61 and the loan date is stored in the loan date storage 62 in the personal information storage 88 in a step S423.

The data indicating the sum of a loan may be stored in both the POS terminal 8 and an IC card 1 by providing a loan sum storage in the IC card 1 and storing the sum of a loan in the IC card 1 using the card reader/writer 84. The total charge may be loaned or the shortfall of a balance may be loaned.

A message showing that payment has been completed is displayed on the display 81 of the POS terminal 8 by this procedure in the step S424 and the payment process is ended in the step S425. A non-cataloged member in the step S420, or the user who indicates that he/she wants no loan on the POS register input unit 82 in the step S421, cannot pay the charge for the service or goods and his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426. In this case, the user is required to stop shopping at the supermarket or to initiate a procedure for payment again after he/she pays the required sum in his/her account for his/her IC card.

When the payment for the charge is completed, the IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426.

Electronic money information read from an IC card 1 is supplied to the sales storage 87 in the POS terminal 8,

however, it may be transmitted to a bank and other services via the communication control unit 86.

In this embodiment, the upper limit of a loan and the term of repayment also may be set. This embodiment may be constituted so that a loan and clearing off of a loan are enabled in any POS terminal at the chain stores of a convenience store or a gas station by providing a personal information storage in the center. In such case, personal information, such as the sum of a loan, and electronic money information are transmitted to the center or bank via the communication control unit 86.

Next, an embodiment in a case where the present invention is utilized for an automatic ticket examiner, which is used for payment of the fare for a train or a bus, for example, will be described.

Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention in a case where the present invention is utilized for an automatic ticket examiner. A reference number 1 denotes an IC card, 9 denotes an automatic ticket examiner for an electronic purse and 10 denotes a center. The automatic ticket examiner for an electronic purse 9 has a display, a station code storage 92, a card controller 93, a card reader/writer 94, a processor 95, a communication control processor 96 and a gate controller 97. The center 10 includes a communication control unit 101, a processor 102, a sales storage 103, a personal information storage 104

and a fare data storage 105.

Fig. 10 shows an example of a personal information storage for the automatic ticket examiner shown in Fig. 9, wherein a reference number 110 denotes the personal information storage for the automatic ticket examiner, 111 denotes an entraining station code storage and the other portions have the same reference number as assigned to a corresponding portion in Fig. 5.

Fig. 11 is a flowchart showing the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot for an IC card in the automatic ticket examiner 9 for an electronic purse, which is in the state of waiting for an input in steps S502 and S503, as shown in Figs. 9 and 11, to pay a fare by electronic money transfer, the connection 13 of the IC card 1 is connected to the card reader/writer 94 by the card controller 93 in a step S503.

When the IC card 1 is inserted, the ID number is first read from the IC card 1 to determine whether the user is entraining or detraining. That is, after the ID number of this IC card 1, as stored in the ID number storage 13 of the IC card 1, is read by the card reader/writer 94 and is processed by the processor 95, it is supplied to the processor 102 of the center 10 via the communication control units 96 and 101 in a step S504. The ID numbers cataloged in an ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10, if any, are read

in a step S505, and the ID number read from the IC card 1 is compared with these ID numbers in a step S506.

As a result, if the ID number of the IC card 1 is not cataloged, the owner of this IC card 1 is identified as an incoming passenger, and so processing proceeds in step S506 to an entraining process flowchart shown in Fig. 12(a); and, if the ID number of this IC card 1 is cataloged, the owner of this IC card 1 is identified as an outgoing passenger or a passenger who may already have a current loan. Further, to judge whether a user whose ID number is cataloged is detraining or is an entraining passenger that has a loan, the information stored in a loan amount storage 61 shown in Fig. 10 in the personal information storage 104 in the center 10 is read in a step S507, and it is judged from this information in a step S508 whether the user has a loan. If the user has a loan, the processing for clearing the loan is performed, and since the user is an ongoing passenger, processing proceeds to the entraining flowchart shown in Fig. 12(a).

If the user has a loan, the current balance is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 to clear off the loan automatically and is supplied to the processor 102 of the center 10 via the communication control processors 96 and 101 in a step S509. In this regard, the sum of the loan stored in the loan storage 61 shown in Fig. 10 in the personal information storage 104 and the balance are compared in a step S510. If

it is found that the balance is more than or equal to the loan, the sum of the loan is subtracted from the balance, a new balance is written into the sum information storage 14 of the IC card 1 by the card reader/writer 94 in a step S511, the personal information storage 104 in the center 10 is reset and clearing of the loan is completed in a step S512. If it is found that the balance is less than the loan amount in the step S510, a gate for entrance is shut by the gate controller 97 of the automatic ticket examiner 9 for an electronic purse in a step S513, the IC card 1 is ejected by the card controller 93 in a step S514 and the user is prevented from entering the station in a step S515.

Fig. 12(a) is a flowchart showing an example of the basic processing for entraining in this third embodiment, and Fig. 12(b) is a flowchart showing an example of the basic processing for detraining.

In the case of entraining, the ID number read from the ID number storage 11 of the IC card 1 is cataloged in the ID number storage 60 in the personal information storage 104 in the center 10 in a step S601, as shown in Fig. 12 (a). Similarly, the station code stored in the station code storage 92 in the automatic ticket examiner 9 for an electronic purse is written into the entraining station code storage 111 in a step S602. The gate for entrance is opened by the gate controller 97 in a step S603, the IC card 1 is ejected from the automatic ticket examiner 9 for an electronic purse by the card controller 93 in a step S604

and the processing for entrance is completed in a step S605. However, at this time, no payment is made.

In the case of detrainment, the information stored in the entraining station code storage 111 shown in Fig. 10 in the personal information storage 104 in the center 10 is read in a step S606, as shown in Fig. 12(b), and similarly, the detraining station code is read from the station code storage 92 in the automatic ticket examiner 9 for an electronic purse in a step S607. The charge corresponding to the entrained station is read from fare data stored in the center 10 in a step S608 and the charge is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a step S609.

Data is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 and is compared with the above-described charge in a step S610. As a result, if the balance is more than the charge, processing proceeds for normal payment, and if the balance is less than the charge, processing proceeds for establishing a loan. In the processing for normal payment, the charge is subtracted from the balance in a step S611, the charge is added to the sales storage 103 in the center 10 in a step S612 and a new balance is written into the sum information storage 14 in a step S613. Thus, payment is completed, the gate is opened by the gate controller 97 in a step S618, the IC card 1 is ejected from the automatic ticket examiner 9 for an electronic purse by the card controller 93 in a step S619

and the processing is ended in a step S620.

If it is found that the balance is short in the step S610, a loan is automatically made. That is, a message showing that the balance is short is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a step S614 and the charge is added to the sales storage 103 in a step S615. In this case, the total charge is loaned. The ID number of the IC card 1 is written into the ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10, the sum of the loan is written into the loan storage 61 shown in Fig. 10 and the loan date is written into the loan date storage 62 shown in Fig. 10 in a step S616. Hereby, the processing for a loan is completed, the gate is opened in a step S617, then the IC card 1 is ejected in a step S618 and the processing is ended in a step S619.

So far a case wherein a loan has been made once is described; however, in this embodiment a loan may be made plural times by setting the upper limit of a loan and the term of repayment, or the times of a loan, in the personal information storage 104. The total charge may be loaned or only the shortfall may be loaned. Further, data exchange between the IC card 1 and the automatic ticket examiner 9 for an electronic purse may be made without connection.

Fig. 13 shows an example in case wherein electronic money information relating to the sum of a loan is stored in the above-described IC card 1. The reference number 15

denotes a loan information storage. In this case, since personal information, such as the sum of a loan, is stored in an IC card, the security of the electronic money information can be secured.

Title of the Invention

Electronic Purse Loan System

Background of the Invention and Related Art

The present invention relates to an electronic purse loan system for storing the data of a short amount in a center and a POS terminal to clear off the short amount in the next transaction when a commercial transaction is performed using an electronic purse system.

If a commercial transaction is performed using a prepaid card widespread at present such as a telephone card, the above-described system stops a commercial transaction at that time when the total consumed amount reaches the sum stored in the card.

In the meantime, an electronic purse system in which a transaction is performed by recording the information of a consumed amount in an IC card and others is proposed, however, in such an electronic purse system, a transaction is performed only for the sum payable from an electronic purse as described in Japanese published unexamined patent application No. H3-92966. That is, if the balance stored in an IC card is less than the amount of a transaction, the user of an electronic purse is informed that the balance is short and is urged to judge whether the transaction is to be

stopped, the amount to be paid using an IC card is to be changed or another transaction method such as a credit card is to be used to perform flexible transaction of shopping.

As the above-described prepaid card is used only for payment for a specific service, a card for the amount of money corresponding to it is prepared beforehand. Therefore, there are few occasions on which a balance is short. However, in the above-described electronic purse system, there is a great possibility that the shortage of a balance at the time of payment due to forgetting to pay in a person's own electronic purse and the shortage of a paid amount occurs because an electronic purse is utilized in many fields. Therefore, in the electronic purse system, the balance in an IC card can be checked at any time by a portable balance display and others, however, if a balance is short at the time of a transaction, the transaction by an electronic purse is impossible.

Objects of the Invention

The object of the present invention is to provide an electronic purse system in which a transaction is not stopped due to the shortage of a balance even if the user of the electronic purse system forgets to pay in his account for his own IC card or

even during a time sharing service. Another object of the present invention is to enable correspondence only by the electronic purse system without using another transaction method such as cash and a credit card as heretofore as a method of avoiding the suspension of a transaction.

Summary of the Invention

To achieve the above-described objects, an electronic purse loan system according to the present invention comprises an IC card provided with an ID number for storing electronic money information, an IC card reading/writing means for reading information from the IC card or writing information to the IC card, an input means for inputting a numeric value, an electronic purse terminal provided with a communication control means for sending or receiving data via a public telephone network, a personal information storing means for storing the ID number of the IC card and the information of a sum, a collation means for collating with the ID number and the information of the sum stored in the personal information storing means, a data bank means for storing data such as a movie and an information center provided with a communication control means for sending or receiving data via the public telephone network.

If the sum stored in the electronic money information of an IC card is less than the charge of data when the data stored in the data bank means is read, the processing for loan is performed by storing the total or a part of the charge of the data in the personal information storing means as the information of a sum only if its ID number is verified by collating an ID number read from the IC card by the collation means and the user selects loan via the input means.

Therefore, if the shortage of a balance occurs at the time of payment using the electronic purse system, the processing for loan can be immediately performed by storing the sum of a loan in the center or a POS terminal as the information of a person the ID number whose is cataloged and the suspension of a transaction or the change to another transaction method such as cash and a credit card can be avoided. That is, heretofore, if the shortage of his balance occurs at the time of payment, a transaction is stopped or payment by another transaction method such as cash and a credit card is made, however, according to the present invention, the processing for loan can be immediately performed only by the electronic purse system by storing the information of the sum of a loan in the center or a POS terminal as the information of a person the ID

number whose is cataloged and adding a function for loan to the electronic purse system, the suspension of a transaction or the change to another transaction method can be avoided and a perfect cashless commercial transaction using only the electronic purse system by the user can be realized.

Brief Description of the Drawings

The present invention will be more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which;

Fig. 1 is a block diagram showing an embodiment of an electronic purse loan system according to the present invention. Fig. 2 shows a concrete example of a personal information storage in the electronic purse loan system shown in Fig. 1. Fig. 3 is a flowchart showing a concrete example of the basic operation in the electronic purse loan system shown in Fig. 1 and Fig. 4 is also a flowchart showing another concrete example of the basic operation in the electronic purse loan system shown in Fig. 1. Fig. 5 shows another concrete example of the personal information storage in the electronic purse loan system shown in Fig. 1. Fig. 6 is a flowchart showing further other concrete example of the basic operation in the electronic purse loan system shown in Fig. 1. Fig. 7 is a block diagram showing a

second embodiment of an electronic purse loan system according to the present invention. Fig. 8 is a flowchart showing a concrete example of the basic operation in the electronic purse loan system shown in Fig. 7. Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention. Fig. 10 shows a concrete example of a personal information storage in the electronic purse loan system shown in Fig. 9. Fig. 11 is a flowchart showing a concrete example of the basic operation in the electronic purse loan system shown in Fig. 9 and Fig. 12 is a flowchart showing the operation at the time of entraining and detraining in the flowchart shown in Fig. 11. Fig. 13 is a block diagram showing another concrete example of an IC card in the electronic purse loan system according to the present invention.

Detailed Description of Preferred Embodiments

Embodiments according to the present invention will be described below referring to the drawings.

Fig. 1 is a block diagram showing a first embodiment of an electronic purse loan system according to the present invention, a reference number 1 denotes an IC card and 2 denotes an electronic purse terminal. A reference number 3 denotes a center, 4 denotes a

monitor, 5 denotes a setting top box, 11 denotes an ID number storage and 12 denotes a processor. A reference number 13 denotes a connection, 14 denotes a sum information storage, 21 denotes a display, 22 denotes an input unit and 23 denotes a card controller. A reference number 24 denotes a card reader/writer, 25 denotes a processor, 26 denotes a communication control unit and 31 denotes a communication control unit. A reference number 32 denotes a processor, 33 denotes a sales storage, 34 denotes a personal information storage and 35 denotes a data converter. A reference number 36 denotes a movie bank, 37 denotes a news bank and 38 denotes a sports bank. A reference number 51 denotes a data converter, 52 denotes a setting top box input unit, 53 denotes a communication control unit and 54 denotes a processor.

Fig. 2 shows a concrete example of the personal information storage 34 shown in Fig. 1. A reference number 60 denotes an ID number storage, 61 denotes a loan storage and 62 denotes a loaned date storage. A concrete example shown in Fig. 2 (a) shows a case that loan is given one ID number and a concrete example shown in Fig. 2 (b) shows a case that loan is given a plurality of ID numbers. The latter is for a group such as a family.

Fig. 3 is a flowchart showing a concrete example of the basic processing of this embodiment.

In this embodiment, service data such as a movie, news and sports is read from the center via a telecommunication line such as a public telephone network and the charge is paid using an electronic purse system.

The constitution and the processing shown in Figs. 1 and 3 premise that the owner of an IC card 1 should pay for the charge of a movie by electronic money, the system in this embodiment is placed in the wait state for the input of an IC card 1 until an IC card 1 is inserted into the slot of the electronic purse terminal 2 and a message to that effect is displayed on the display 21 of the electronic purse terminal 2 as a result of the processing in a step S102.

When the user inserts his/her IC card into the slot of the electronic purse terminal 2, the IC card is inserted by the card controller 23 of the electronic purse terminal 2, the connection 13 of the IC card 1 is connected to the card reader/writer 24 of the electronic purse terminal 2 and the electronic purse terminal 2 verifies the IC card 1 is inserted in a step S103.

When it is verified that the IC card 1 is inserted, it is first checked whether the owner of the

IC card 1 is the cataloged member of the center 3 or not. For that purpose, an ID number proper to the IC card stored in the ID number storage 11 of the IC card 1 is read by the card reader/writer 24 in the electronic purse terminal 2 in a step S104 and after it is processed in the processor 25, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. The cataloged ID number is read from the ID number storage 60 shown in Fig. 2 in the personal information storage 34 in the center 3 in a step S105 and the ID number stored in the IC card 1 is collated with this cataloged ID number to check whether the ID number stored in the IC card 1 is cataloged in the center 3 or not in a step S106. When it is verified that the ID number stored in the IC card is a cataloged member hereby, a function for loan is usable, however, if the ID number stored in the IC card is not a cataloged member, the function for loan cannot be used, only a normal transaction by electronic money is allowed and processing proceeds to a step S114.

If the function for loan of the center 3 pays the charge of the last service on the behalf of the cataloged member, the member cannot receive next service while no charge of the last service is cleared off by

the member. Therefore, the contents of the information of the member stored in the personal information storage 34 in the center 3 are referred in a step S107 and it is checked whether a loan exists in the last transaction or not in a step S108. As a result, if no loan exists, processing proceeds to the step S114 to take a normal procedure for payment.

If it is verified in the step S108 that the last loan exists, the sum of the last loan is displayed on the display 21 of the electronic purse terminal 2, a message which urges to select whether the loan is to be cleared off or not is also displayed and the owner of the IC card 1 selects either via the input unit 22 of the electronic purse terminal 2 in a step S109. If clearing is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 23 in the electronic purse terminal 2 in a step S110 and is compared with the loan stored in the loan storage 61 shown in Fig. 2 in the personal information storage 34 in the center 3 by the processor 32 in a step S111.

If the balance is more than the loan, the loan is subtracted from the balance by the processor 32 and a new balance is written to the sum information storage 14 of the IC card 1 by the card reader/writer 24 in a step

S112. The loan storage 61 and the loaned date storage 62 respectively shown in Fig. 2 in the personal information storage 34 in the center 3 are reset in a step S113.

Clearing off the loan in the last transaction is finished by the above-described steps and processing proceeds to the procedure for next service. If the loan is not cleared off in the step S109 or the balance is short in the step S111, next service cannot be received, the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step ~~S128~~ S129 and the processing is finished in a step S130.

If the owner of the IC card is not a cataloged member in the step S106 or no loan exists in the step S108 even if the owner is a cataloged member when processing proceeds as far as the above-described step S113, first the contents of a variety of services such as a movie, news and sports which this system can provide are displayed on the monitor 4 and the user can select his/her desired service on the input unit 51 of the setting top box 5. For example, when a movie is selected, the titles of movies and the charge are displayed in a step S114 and the user selects the title of his/her desired movie on the input unit 52 in a step S115.

When the title is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 and is compared with the charge of this selected movie by the processor 32 of the center 3 in a step S116. As a result, if the balance is more than or equal to the charge, the charge is subtracted from the balance by the processor 32 in a step S117, is added to the sales storage 33 in a step S118, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 and the payment for the charge is finished in a step S119.

Hereby, the data of the movie selected from the movie bank 36 is read and converted by the data converter 35, is sent to the processor 32 of the center 3 and is transferred to the setting top box 5 via the communication control unit 31. The data is fetched in the setting top box 5 via the communication control unit 53, movie data is converted by the data converter 51 in a step S125 and the movie is presented on the monitor 4 in a step S126.

If the balance is less than the charge in the step S116, a message showing the balance is short is displayed on the display 21 of the electronic purse terminal 2 in a step S120. And it is checked again

whether the ID number of the user of the IC card 1 is cataloged or not in a step S121 and as a result, when it is verified that the user is a cataloged member, a message which urges the user to select whether he/she has a loan or not is displayed on the display 21 and the user is urged to select either in a step S122.

If the user selects having loan on the electronic purse input unit 22 in the step S122, the charge is added to the sales storage 33 in the center 3 in a step S123, the sum of the loan is stored in the loan storage 61 shown in Fig. 2 and the loaned date is stored in the loaned date storage 62 shown in Fig. 2 respectively in the personal information storage 34 in a step S124. In this case, the total charge is processed as the sum of the loan. Payment is finished by this procedure and the presentation of the desired movie is started in steps S125 and S126.

If the user is not a cataloged member in the step S121 or if the user selects not having loan on the electronic purse input unit 22 in the step S122 even if he/she is a cataloged member, the user cannot enjoy a movie and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S129.

When the movie is finished, a message which urges the user to select whether the service is to be finished or another movie is to be selected is displayed on the monitor in a step S127. When the user selects enjoying another movie on the input unit 52 of the setting top box 5, processing is returned to a state in which the titles of the movies and the charge are displayed on the monitor 4 in the step S114 and if the user pays the charge, he/she can enjoy another movie.

When the user selects the finish of the service on the setting top box input unit 52 in the step S127, the service is finished in a step S128 and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S129.

An IC card 1 may be provided with a loaned sum storage to collate the data of a loaned sum read from each IC card by the card reader/writer 24 with the data stored in the center 3. The total charge may be loaned and the amount in which the balance is short may be loaned. In the latter case, the balance stored in the sum information storage 14 of an IC card 1 is required to be updated.

In the above-described embodiment, in case a plurality of ID numbers in a family are grouped in the personal information storage 34 as shown in Fig. 2 (b)

and are stored in the center 3 as group information, a member of the group can clear off the loan given to another member. Therefore, the charge of the movies enjoyed by a child can be paid by his/her parent in a lump.

In the above-described embodiment, the electronic purse terminal 2 and the setting top box 5 are separate, however, the electronic purse system may be built in the setting top box.

Next, the processing in this embodiment of a case that the term of repayment is determined will be described.

Fig. 4 is a flowchart showing the basic processing for payment in this embodiment in which the term of repayment is determined and which is provided with a function for loan.

As shown in Figs. 1 and 4, when an IC card 1 is inserted into the slot of an electronic purse terminal 2 in the wait state for an input in steps S202 and S203 if the owner of the IC card 1 pays the charge of a service by electronic money, the IC card 1 is inserted by a card controller 23 in the electronic purse terminal 2 and the connection 13 of the IC card 1 is connected to a card reader/writer 24.

The electronic purse terminal 2 verifies the input of the IC card 1 in the step S203 and first checks whether the owner of this IC card 1 is a cataloged member of a center 3 or not.

That is, the ID number proper to this IC card stored in the ID number storage 11 of the IC card 1 is read by the card reader/writer 24 in a step S204 and after it is processed in a processor 25 in the electronic purse terminal 2, it is supplied to the processor 32 of the center 3 via the communication control unit 26 of the electronic purse terminal 2 and the communication control unit 31 of the center 3. Its cataloged ID number is read from an ID number storage 61 shown in Fig. 2 in a personal information storage 34 in the center 3 in a step S205 and it is checked whether the ID number is cataloged in the center 3 or not by collating the ID number read from the IC card 1 with this cataloged ID number in a step S206. If the ID number is cataloged in the center 3, a function for loan is usable, however, if it is not a cataloged member, a function for loan cannot be utilized, only a normal transaction is enabled and processing proceeds to a step S214.

If the charge of the last service is paid utilizing this function for loan of the center 3 when an

ID number is a cataloged member, clearing is required, however, in this embodiment, if the date is within the date to be repaid, further loan can be given even if the above-described charge is not cleared off.

In a step S207, the user's former transactions are checked referring to the contents of a loaned date storage 62 shown in Fig. 2 in the personal information storage 34 in the center 3 and as a result, if the user is given no loan in a step S208, processing proceeds to the step S214 for a normal procedure.

If the user is given the loan of the last charge in the step S208, the sum of the former loan is displayed on the display 21 of the electronic purse terminal 2 and the user is urged to select whether he/she clears off the loan or not in a step S209. If the balance stored in the sum information storage 14 of the IC card 1 is more than the loan, the loan can be cleared off, however, if the balance is short or if clearing is not yet performed, the user can refuse clearing. In this case, processing proceeds to the step S214.

If clearing is selected in the step S209, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 of the electronic purse terminal 2 in a step S210 and is

compared with the sum of the loan stored in the loan storage 61 shown in Fig. 2 in the personal information storage 34 in the center 3 by the processor 32 in a step S211. If the balance is more than the loan, the loan is subtracted from the balance by the processor 32, a new balance is written to the sum information storage 14 of the IC card 1 by the card reader/writer 24 of the electronic purse terminal 2 in the step S212 and the sum of the loan stored in the loan storage 61 shown in Fig. 2 and the loaned date stored in the loaned date storage 62 shown in Fig. 2 respectively in the personal information storage 34 in the center 3 are reset in the step S213.

Clearing of the former transaction is finished by the above-described steps and processing proceeds to a procedure for this service. If the former transaction is not cleared off in the step S209 or if the balance is short in the step S211, a new service is provided without clearing off the loan.

Next, the contents of services and the charge are displayed on the monitor 4 in the step S214 and the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S215.

When a service is selected as described above, the balance stored in the sum information storage 14 of

the IC card 1 is read by the card reader/writer 24 and sent to the processor 32 of the center 3 to compare the balance with the charge of the service in a step S216. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S217 and is added to the sales storage 33 by the processor 32 in a step S218. The balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 of the electronic purse terminal 2 in a step S219.

Hereby, payment is finished, data is transferred to the setting top box 5 in a step S228 and service is started in a step S229.

If the balance is less than the charge in the step S216, the shortfall is displayed on the display 21 of the electronic purse terminal 2 in a step S220. The ID number is referred again and it is checked whether the number is a cataloged member or not in a step S221. As a result, if the ID number is a cataloged member, a message which urges the user to select whether the user has a loan or not is displayed on the display 21 of the electronic purse terminal 2 in a step S222.

If the user selects he/she has a loan on the input unit 22 of the electronic purse terminal 2 in a step S222, data stored in the loaned date storage 62

shown in Fig. 2 in the personal information storage 34 in the center 3 is read to check whether the user has a loan at the last time or not in a step S223 and if the user is given no loan formerly, processing proceeds to a step S225 so as to give the user loan immediately.

If the user is given loan in the step S223 and the date is within the term of repayment set by the center 3, for example 28th every month in a step S224, the charge is added to the sales storage 33 by the processor 32 of the center 3 in a step S225, and the loan storage 61 shown in Fig. 2 and the loaned date storage 62 shown in Fig. 2 respectively in the personal information storage 34 are updated in a step S226.

Payment by loan is finished by this procedure, processing proceeds to the step S228 and service is started in the step S228.

In this case, the total charge may be loaned or only the shortfall may be loaned.

If the term of repayment is over, a message for informing the user that the term of repayment is over is displayed on the display 21 of the electronic purse terminal 2 in a step S227, the user cannot receive service as a non-cataloged member or the user who selects that he/she has no loan on the input unit 22 of the electronic purse terminal 2 and the IC card 1 is

ejected from the electronic purse terminal 2 by the card controller 23 in a step S232.

When the service is finished, a message which urges the user to select whether service is to be finished or a new service is to be provided is displayed on the monitor 4 in a step S230. If the user selects that he/she receives a new service on the input unit 52 of the setting top box 5, processing is returned to a state in which the contents of services and the charge are displayed on the monitor 4 in the step S214 and when payment is made, the user can receive a new service.

If the user selects that service is to be finished on the input unit 52 of the setting top box 5 in the step S230, service is finished in the step S231 and the IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S232. Hereby, a series of processing is finished in a step S233.

In this embodiment, repayment is set to payment in monthly installments and charges can be loaned many times within the term of repayment, however, a repayment term storage may be provided to the personal information storage 34 in the center 3 and it may be set that charges can be loaned many times within the term of

repayment set as the number of days from the day of the first loan.

Next, the processing in this embodiment in case the upper limit of a loan is determined will be described.

Fig. 5 shows a concrete example of the personal information storage 34 shown in Fig. 1 in which the upper limit of a loan is stored, a reference number 60 denotes the ID number storage, 71 denotes a loan upper limit storage, 61 denotes the loan storage and 62 denotes the loaned date storage.

Fig. 6 is a flowchart showing the basic processing when payment is made in this embodiment provided with a function for loan the upper limit of which is determined and the upper limit of a loan is stored in the loan upper limit storage 71 in the personal information storage 34 shown in Fig. 5.

In this case, the processing shown in the steps S201 to S 213 shown in Fig. 4 is also the same, hereby the loan in the former transaction is cleared off and after the contents of services and the charge are displayed on the monitor 4 in a step S301, the user selects his/her desired service on the input unit 52 of the setting top box 5 in a step S302.

When the service is selected, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 24 in the electronic purse terminal 2 and sent to the processor 32 of the center 3 to compare the balance with the charge in a step S303. As a result, if the balance is more than the charge, the charge is subtracted from the balance by the processor 32 in a step S304 and the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 24 in a step S305. The charge is added to the sales storage 33 by the processor 32 in a step S306.

Hereby, payment is finished, the data of the selected service is transferred to the setting top box 5 in a step S315 and service is started in a step S316.

If the balance is less than the charge in the step S303, a message showing the balance is short is displayed on the display 21 of the electronic purse terminal 2 in a step S307. It is checked again whether the user is a cataloged member or not in a step S308 and if it is verified that the user is a cataloged member, a message which urges the user to select whether he/she has a loan or not is displayed on the display 21 of the electronic purse terminal 2 in a step S309.

If the user selects that he/she has a loan on the input unit 22 of the electronic purse terminal 2, the charge of the service is added to the present sum of the loan stored in the loan storage 61 shown in Fig. 5 in the personal information storage 34 in the center 3 to calculate the new sum of the loan in a step S310. This new sum of the loan and the upper limit of the loan stored in the loan upper limit storage 61 shown in Fig. 5 in the personal information storage 34 are compared by the processor 32 of the center 3 in a step S311 and as a result, if the loan is less than the upper limit, the charge of the service is added to the sales storage 33 by the processor 32 in a step S312. The sum of the loan stored in the loan storage 61 shown in Fig. 5 in the personal information storage 34 in the center 3 is updated in a step S313.

Payment is finished by the above-described procedure and service is started in the step S315.

If the user is not a cataloged member in the step S308 or if the user selects that he/she has no loan on the input unit 22 in the step S309 even if he/she is a cataloged member, he/she cannot receive service and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in a step S319.

If the user's loan exceeds the upper limit in the step S311, a message showing his/her loan exceeds the upper limit is displayed on the display 21 of the electronic purse terminal 2 in the step S314 and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S319.

When service is finished, a message which urges the user to select whether service is to be finished or a new service is to be provided is displayed on the monitor 4 in the step S317. When the user selects the provision of a new service on the input unit 52 of the setting top box 5, processing is returned to a state in which the contents of services and the charge are displayed on the monitor 4 in the step S301 and when payment is finished, the user can receive service.

If the user selects the finish of service on the input unit 52 of the setting top box 5, service is finished in the step S318 and his/her IC card 1 is ejected from the electronic purse terminal 2 by the card controller 23 in the step S319. Hereby, a series of processing is finished in a step S320.

In this embodiment, the upper limit of a loan can be arbitrarily set by providing the loan upper limit storage 71 shown in Fig. 5 to the personal information storage 34, however, the upper limit of any user's loan

of the center may be equal without this loan upper limit storage 71.

A storage for storing the term of repayment and the number of times of loan may be provided in the personal information storage 34 in addition to the upper limit of a loan to adjust the sum of a loan.

In this embodiment, the total charge is paid by loan, however, if the user does not want to pay the total charge by loan, only the shortfall of the balance may be paid by loan.

The electronic purse loan system in case data from the center such as a movie is received via the setting top box is described above, however, a case that the contents of a game are received via the setting top box may be also considered. In this case, the charge may be charged every game independent of the time or the charge may be charged every fixed time in which games are provided. In the former system, a function for loan can be utilized at the time of clearing as the case of a movie. In the latter system, clearing is automatically performed every fixed time in which games are provided and only if the balance stored in an IC card is short, a game is temporarily suspended and a function for loan is executed.

As described above, even if the balance stored in an IC card is short when a game is provided based upon payment by the fixed time, the game can be continued owing to a function for loan.

Next, an embodiment in case the present invention is used for a POS register terminal in a supermarket and others will be described.

Fig. 7 is a block diagram showing a second embodiment of an electronic purse loan system according to the present invention in case it is used for such a POS terminal. A reference number 8 denotes a POS terminal, 81 denotes a display, 82 denotes a POS register keyboard input unit, 83 denotes a card controller and 84 denotes a card reader/writer. A reference number 85 denotes a processor, 86 denotes a communication control unit, 87 denotes a sales storage, 88 denotes a personal information storage and an IC card 1 is the same as in the embodiment shown in Fig. 1.

Fig. 8 is a flowchart showing a concrete example of the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot of the POS terminal 8 which is in the wait state for input in steps S402 and S403 to pay the charge of service by electronic money, it is verified in a step S403 that the IC card 1 is inserted.

When it is verified that the IC card 1 is inserted, it is first checked whether the owner of the IC card 1 is a cataloged member of the POS terminal 8 or not.

Therefore, the ID number proper to the IC card stored in the ID number storage 11 of the IC card 1 is read by the card reader/writer 84 in the POS terminal 8 in a step S404 and is supplied to the processor 85 of the POS terminal 8. Next, the cataloged ID number is read from an ID number storage 60 in the personal information storage 88 (provided with the same constitution as the personal information storage 34 shown in Fig. 2 in this embodiment) in the POS terminal 8 in a step S405 and it is checked by collating the ID number read from the IC card with this ID number whether the ID number is cataloged in the POS terminal 8 or not in a step S406.

Hereby, if it is verified that the ID number is cataloged, payment by the loan system is enabled, however, if the ID number is not cataloged, the owner of the IC card cannot utilize the loan system, only a normal transaction by electronic money is enabled and processing proceeds to a step S414.

Only if a cataloged member paid the charge of the last service utilizing the loan function of the POS

terminal 8, he/she cannot receive this service without clearing. Therefore, the last transaction is checked in a step S408 by referring to the contents stored in a loan storage 61 shown in Fig. 2 and a loaned date storage 62 shown in Fig. 2 respectively in the personal information storage 88 in the POS terminal 8 in a step S407. As a result, if the owner has no loan, processing proceeds to a step S414 for normal payment.

If it is verified in the step S408 that the owner had a loan at the last time, the sum of the loan at that time is displayed on the display 81 of the POS terminal 8, a message which urges the owner of the IC card 1 to select whether the loan is to be cleared off or not is displayed there and he/she selects either on the POS register keyboard input unit 82 in a step S409. If the owner selects clearing, the balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 in the POS terminal 8 in a step S410 and is compared with the sum of the loan stored in the loan storage 61 shown in Fig. 2 in the personal information storage 34 by the processor 85 in a step S411.

If the balance is more than the sum of the loan, the sum of the loan is subtracted from the balance by the processor 85 and a new balance is written to the sum

information storage 14 of the IC card 1 by the card reader/writer 84 in a step S412. The loan storage 61 shown in Fig. 2 and the loaned date storage 62 shown in Fig. 2 respectively in the personal information storage 88 in the POS terminal 8 are reset in a step S413.

Clearing off a loan in the last transaction is finished by the above-described procedure and a procedure for this service is started. If a loan is not cleared off in the step S409 or the balance is short in the step S411, the owner cannot receive service, his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in a step S426 and the processing is finished in a step S427.

If the owner is not a cataloged member in the step S406 or if he/she has no loan even if he/she is a cataloged member when processing proceeds to the above-described step S413, first the contents of this service and the charge are displayed on the display 81 of the POS terminal 8 in the step S414. The balance stored in the sum information storage 14 of the IC card 1 is read by the card reader/writer 84 and is compared with the charge of this service by the processor 85 in a step S415. As a result, if the balance is more than or equal to the charge, the charge is subtracted from the balance by the processor 85 in a step S416, the charge is added

to the sales storage 87 in a step S417, the balance stored in the sum information storage 14 of the IC card 1 is updated by the card reader/writer 84 in a step S418, a message showing the finish of payment is displayed on the display 81 of the POS terminal 8 in a step S424 and payment is finished in a step S425.

If the balance stored in the IC card 1 is less than the charge of this service in a step S421, a message showing the balance is short is displayed on the display 81 of the POS terminal 8 in a step S419. It is checked again whether the ID number of the IC card 1 is cataloged or not in a step 420. As a result, if the ID number is cataloged, a message which urges the owner to select whether he/she has a loan or not is displayed on the display 81 in the step S421.

If the owner selects he/she has a loan on the POS register input unit 82 in the step S421, the charge is added to the sales storage 87 in the POS terminal 8 in a step S422, the sum of the loan is stored in the loan storage 61 shown in Fig. 2 in the personal information storage 88 and the loaned date is stored in the loaned date storage 62 shown in Fig. 2 in the personal information storage 88 in a step S423.

The data of the sum of a loan may be stored in both the POS terminal 8 and an IC card 1 by providing a

loaned sum storage to the IC card 1 and storing the sum of a loan in the IC card 1 by the card reader/writer 84. The total charge may be loaned or the shortfall of a balance may be loaned.

A message showing payment is finished is displayed on the display 81 of the POS terminal 8 by this procedure in the step S424 and payment is finished in the step S425. A non- cataloged member in the step S420 or the user who selects he/she has no loan on the POS register input unit 82 in the step S421 cannot pay the charge of this service and his/her IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426. In this case, the user is required to stop shopping at a supermarket or to take a procedure for payment again after he/she pays the required sum in his/her account for his/her IC card.

When the payment of the charge is finished, the IC card 1 is ejected from the POS terminal 8 by the card controller 83 in the step S426.

Electronic money information read from an IC card 1 is supplied to the sales storage 87 in the POS terminal 8, however, it may be transmitted to a bank and others via the communication control unit 86.

In this embodiment, the upper limit of a loan and the term of repayment may be also set. This

embodiment may be constituted so that loan and clearing off a loan are enabled in any POS terminal at the chain stores of a convenience store or a gas station by providing a personal information storage to the center. In the case, personal information such as the sum of a loan and electronic money information are transmitted to the center or a bank via the communication control unit 86.

Next, an embodiment in case the present invention is utilized for an automatic ticket examiner used for payment of the fare of a train or a bus will be described.

Fig. 9 is a block diagram showing a third embodiment of an electronic purse loan system according to the present invention in case the present invention is utilized for such an automatic ticket examiner. A reference number 1 denotes an IC card, 9 denotes an automatic ticket examiner for an electronic purse, 10 denotes a center, 91 denotes a display and 92 denotes a station code storage. A reference number 93 denotes a card controller, 94 denotes a card reader/writer, 95 denotes a processor, 96 denotes a communication control processor and 97 denotes a gate controller. A reference number 101 denotes a communication control unit, 102 denotes processor, 103 denotes a sales storage, 104

denotes a personal information storage and 105 denotes fare data.

Fig. 10 shows a concrete example of a personal information storage for the automatic ticket examiner shown in Fig. 9, a reference number 110 denotes the personal information storage for the automatic ticket examiner, 111 denotes an entraining station code storage and the same reference number is assigned to a portion corresponding to that in the above-described drawings.

Fig. 11 is a flowchart showing the basic processing in this embodiment.

When the owner of an IC card 1 inserts the IC card 1 into the slot for an IC card of the automatic ticket examiner 9 for an electronic purse which is in the wait state for input in steps S502 and S503 as shown in Figs. 9 and 11 to pay a fare by electronic money, the connection 13 of the IC card 1 is connected to the card reader/writer 94 by the card controller 93 in a step S503.

When the IC card 1 is inserted, the ID number is first read from the IC card 1 to check whether the user entrains or detrains.

That is, after the ID number proper to this IC card 1 stored in the ID number storage 13 of the IC card 1 is read by the card reader/writer 94 and is processed

by the processor 95, it is supplied to the processor 102 of the center 10 via the communication control units 96 and 101 in a step S504. Its ID number cataloged in an ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10 if any is read in a step S505 and the ID number read from the IC card 1 is compared with this ID number in a step S506. As a result, if the ID number of the IC card 1 is not cataloged, the owner of this IC card 1 is an incoming passenger, processing proceeds to an entraining flowchart shown in Fig. 12 (a) and if the ID number of this IC card 1 is cataloged, the owner of this IC card 1 is an outgoing passenger or a passenger who had a loan at the last time.

Further, to judge whether a user the ID number whose is cataloged detrains or he/she has a loan, the contents stored in a loan storage 61 shown in Fig. 10 in the personal information storage 104 in the center 10 are read in a step S507 and it is judged in a step S508 whether the user has a loan or not based upon the contents. If the user has a loan, the processing for clearing is performed and as the user is an outgoing passenger except it, processing proceeds to a detraining flowchart for paying a fare shown in Fig. 12 (b).

If the user has a loan, the balance is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 to clear off the loan automatically and is supplied to the processor 102 of the center 10 via the communication control processors 96 and 101 in a step S509.

The sum of the loan stored in the loan storage 61 shown in Fig. 10 in the personal information storage 104 and the balance are compared in a step S510, if the balance is more than or equal to the loan, the sum of the loan is subtracted from the balance, a new balance is written to the sum information storage 14 of the IC card 1 by the card reader/writer 94 in a step S511, the personal information storage 104 in the center 10 is reset and clearing is finished in a step S512.

If the balance is less than the loan in the step S510, a gate for entrance is shut by the gate controller 97 of the automatic ticket examiner 9 for an electronic purse in a step S513, the IC card 1 is ejected by the card controller 93 in a step S514 and the user cannot enter the yard of a station in a step S515.

Fig. 12 (a) is a flowchart showing a concrete example of the basic processing for entraining in this third embodiment and Fig. 12 (b) is a flowchart showing

a concrete example of the basic processing for detrainment.

In the case of entraining, its ID number read from the ID number storage 11 of the IC card 1 is cataloged in the ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10 in a step S601 as shown in Fig. 12 (a). Similarly, its station code stored in the station code storage 92 in the automatic ticket examiner 9 for an electronic purse is written to the entraining station code storage 111 shown in Fig. 10 in a step S602. The gate for entrance is opened by the gate controller 97 in a step S603, the IC card 1 is ejected from the automatic ticket examiner 9 for an electronic purse by the card controller 93 in a step S604 and the processing for entrance is finished in a step S605. However, at this time, no payment shall be made.

In the case of detrainment, the contents stored in the entraining station code storage 111 shown in Fig. 10 in the personal information storage 104 in the center 10 are read in a step S606 as shown in Fig. 12 (b) and similarly, its detraining station code is read from the station code storage 92 in the automatic ticket examiner 9 for an electronic purse in a step S607. The charge corresponding to its entrained section is read from fare

data stored in the center 10 in a step S608 and the charge is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a step S609.

Data is read from the sum information storage 14 of the IC card 1 by the card reader/writer 94 to compare with the above-described charge in a step S610. As a result, if the balance is more than the charge, processing proceeds to processing for normal payment and if the balance is less than the charge, processing proceeds to processing for loan.

In processing for normal payment, the charge is subtracted from the balance in a step S611, the charge is added to the sales storage 103 in the center 10 in a step S612 and a new balance is written to the sum information storage 14 in a step S613. Hereby, payment is finished, the gate is opened by the gate controller 97 in a step S618, the IC card 1 is ejected from the automatic ticket examiner 9 for an electronic purse by the card controller 93 in a step S619 and the processing is finished in a step S620.

If the balance is short in the step S610, loan is automatically made. That is, a message showing the balance is short is displayed on the display 91 of the automatic ticket examiner 9 for an electronic purse in a

step S614 and the charge is added to the sales storage 103 in a step S615. In this case, the total charge is loaned. The ID number of the IC card 1 is written to the ID number storage 60 shown in Fig. 10 in the personal information storage 104 in the center 10, the sum of the loan is written to the loan storage 61 shown in Fig. 10 and the loaned date is written to the loaned date storage 62 shown in Fig. 10 in a step S616. Hereby, the processing for loan is finished, the gate is opened in a step S617, then the IC card 1 is ejected in a step S618 and the processing is finished in a step S619.

So far a case that loan is made once is described, however, in this embodiment loan may be made plural times by setting the upper limit of a loan and the term of repayment or the times of loan in the personal information storage 104. The total charge may be loaned or only the shortfall may be loaned. Further, data exchange between the IC card 1 and the automatic ticket examiner 9 for an electronic purse may be made without connection.

Fig. 13 shows a concrete example in case electronic money information of the sum of a loan is stored in the above- described IC card 1. A reference number 15 denotes a loan information storage. In this

case, as personal information such as the sum of a loan is stored in an IC card, the security of electronic money information can be secured.

We claim;

1. An electronic purse loan system, comprising:

an IC card provided with an ID number for storing electronic money information;

an electronic purse terminal comprising an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card, an input means for inputting a numeric value and others and a first communication control means for sending or receiving data via a public telephone network; and

an information center comprising a personal information storage means for storing the ID number of said IC card and the information of the sum, a collation means for collating the ID number of said IC card and the information of the sum stored in said IC card with its ID number and the information of the sum stored in said personal information storage means, a data bank means for storing data such as a movie and a second communication control means for sending or receiving data via a communication line such as a public telephone network, wherein:

when said information center reads data stored in said data bank means, said electronic purse terminal subtracts electronic money information equivalent to the

charge of said data from data stored in said IC card using said IC card reading/writing means and sends said electronic money information to said information center via said first and second communication control means.

2. An electronic purse loan system according to Claim 1, wherein:

if electronic money information stored in said IC card is less than the charge of said data when said information center reads data stored in said data bank means, the ID number is verified by collating its ID number read from said IC card by said collation means; and

only if the user selects loan using said input means, the total or a part of the charge of said data is stored as the information of the sum in said personal information storage means.

3. An electronic purse loan system according to Claim 1, wherein:

if the information of the sum is already stored in said personal information storage means when said information center reads data from said data bank means, said electronic purse terminal subtracts electronic money information equivalent to the information of the sum from data stored in said IC card using said IC card reading/writing means;

then, electronic money information equivalent to the charge of said data is subtracted from data stored in said IC card; and

this electronic money information is sent to said information center via said first and second communication control means.

4. An electronic purse loan system, comprising:

an IC card provided with an ID number for storing electronic money information;

an electronic purse terminal comprising an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card, an input means for inputting a numeric value and others and a first communication control means for sending or receiving data via a communication line such as a public telephone network; and

an information center comprising a personal information storage means for storing the ID number of said IC card, the information of the sum and loaned date information, a collation means for collating with its ID number, the information of the sum and loaned date information stored in said personal information storage means, a data bank means for storing data such as a movie and a second communication control means for

sending or receiving data via a public telephone network, wherein:

when said information center reads data stored in said data bank means, said electronic purse terminal subtracts electronic money information equivalent to the charge of said data from data stored in said IC card using said IC card reading/writing means; and

said electronic purse terminal sends said electronic money information to said information center via said first and second communication control means.

5. An electronic purse loan system according to Claim 4, wherein:

if electronic money information stored in said IC card is less than the charge of data when said information center reads data stored in said data bank means, the ID number is verified by collating its ID number read from said IC card by said collation means; and

only if the user selects loan using said input means, the total or a part of the charge of said data is stored as the information of the sum in said personal information storage means.

6. An electronic purse loan system according to Claim 4, wherein:

if the information of the sum is already stored in said personal information storage means when said information center reads data from said data bank means, it is checked whether loaned date information stored in said personal information storage means is within the term of repayment or not by said collation means;

if the loaned date is within the term, the total or a part of the charge of said data is stored as the information of the sum in said personal information storage means;

in the meantime, if the loaned date is over the term of repayment, said electronic purse terminal subtracts electronic money information equivalent to said information of the sum from data stored said IC card using said IC card reading/writing means;

then, said electronic purse terminal subtracts electronic money information equivalent to the charge of said data from data stored in said IC card; and

said electronic purse terminal sends this electronic money information to said information center via said first and second communication control means.

7. An electronic purse loan system, comprising:

an IC card provided with an ID number for storing electronic money information;

an electronic purse terminal comprising an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card, an input means for inputting a numeric value and others and a first communication control means for sending or receiving data via a communication line such as a public telephone network; and

an information center comprising a personal information storage means for storing the ID number of said IC card, the information of the sum and the information of the upper limit of a loan, a collation means for collating with the ID number, the information of the sum and the information of the upper limit of a loan stored in said personal information storage means, a data bank means for storing data such as a movie and a second communication control means for sending or receiving data via a public telephone network, wherein

when said information center reads data stored in said data bank means, said electronic purse terminal subtracts electronic money information equivalent to the charge of said data from data stored in said IC card using said IC card reading/writing means; and

said electronic purse terminal sends said electronic money information to said information center via said first and second communication control means.

8. An electronic purse loan system according to Claim 7, wherein:

if electronic money information stored in said IC card is less than the charge of said data when said information center reads data stored in said data bank means, the ID number is verified by collating its ID number read from said IC card by said collation means; and

only if the user selects loan using said input means, the total or a part of the charge of said data is stored as the information of the sum in said personal information storage means.

9. An electronic purse loan system according to Claim 7, wherein:

if the information of the sum is already stored in said personal information storage means when said information center reads data stored in said data bank means, it is checked whether said information of the sum stored in said personal information storage means is within the upper limit of a loan or not by said collation means;

if the information of the sum is within the upper limit, the total or a part of the charge of said data is stored as the information of the sum in said personal information storage means;

in the meantime, if the information of the sum exceeds the upper limit, said electronic purse terminal subtracts electronic money information equivalent to said information of the sum from data stored in said IC card using said IC card reading/writing means;

then, said electronic purse terminal subtracts electronic money information equivalent to the charge of said data from data stored in said IC card; and

said electronic purse terminal sends this electronic money information to said information center via said first and second communication control means.

10. An electronic purse loan system, comprising:

an IC card provided with an ID number for storing electronic money information; and

a terminal comprising an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card, an input means for inputting a numeric value and others, a personal information storage means for storing the ID number of said IC card and the information of the sum and a collation means for collating with the ID number and the information of the sum stored in said personal information storage means, wherein:

when the payment of a commercial transaction is made, said terminal subtracts electronic money information equivalent to the sum to be paid for said commercial transaction from data stored in said IC card using said IC card reading/writing means.

11. An electronic purse loan system according to Claim 10, wherein:

if electronic money information stored in said IC card is less than the said sum to be paid, the ID number is verified by collating its ID number read from said IC card by said collation means; and

only if the user selects loan using said input means, the total or a part of said sum to be paid is stored as the information of the sum in said personal information storage means.

12. An electronic purse loan system according to Claim 10, wherein:

if the information of the sum is already stored in said personal information storage means, said terminal subtracts electronic money information equivalent to said information of the sum from data stored in said IC card using said IC card reading/writing means; and

then, said terminal subtracts electronic money information equivalent to said charge to be paid from data stored in said IC card.

13. An electronic purse loan system, comprising:

an IC card provided with an ID number for storing electronic money information;

an automatic ticket examiner provided with an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card and a first communication control means for sending or receiving data via a public telephone network; and

an information center provided with a personal information storage means for storing the ID number of said IC card and the information of the sum, a collation means for collating with the ID number and the information of the sum stored in said personal information storage means and a second communication control means for sending or receiving data via a public telephone network, wherein:

said automatic ticket examiner subtracts electronic money information equivalent to a fare from data stored in said IC card using said IC card reading/writing means if the payment of said fare is made by said automatic ticket examiner; and

said automatic ticket examiner sends said electronic money information to said information center via said first and second communication control means.

14. An electronic purse loan system according to Claim 13, wherein:

if electronic money information stored in said IC card is less than said fare, said information center collates its ID number read from said IC card using said collation means; and

only if said ID number is verified, the total or a part of said fare is stored as the information of the sum in said personal information storage means.

15. An electronic purse loan system according to Claim 13, wherein:

if the information of the sum is already stored in said personal information storage means, said automatic ticket examiner subtracts electronic money equivalent to said information of the sum from data stored in said IC card using said IC card reading/writing means;

then, said automatic ticket examiner subtracts electronic money information equivalent to said fare from data stored in said IC card; and

said automatic ticket examiner sends this electronic money information to said information center via said first and second communication control means.

16. An electronic purse loan system, comprising:

an IC card comprising a sum information storage for storing electronic money information, a loan information storage for storing electronic money information equivalent to the sum of a loan and an ID number storage for storing an ID number; and

a terminal comprising an IC card reading/writing means for reading information stored in said IC card or writing information to said IC card, an input means for inputting a numeric value and others, a personal information storage means for storing the ID number of said IC card and a collation means for collating the ID number of said IC card with the ID number stored in said personal information storage means, wherein:

when the payment of a commercial transaction is made, said terminal subtracts electronic money information equivalent to the sum to be paid for the commercial transaction from data stored in the sum information storage of said IC card using said IC card reading/writing means.

17. An electronic purse loan system according to Claim 16, wherein:

if electronic money information stored in said IC card is less than said sum to be paid, said terminal collates its ID number read from said IC card using said collation means so as to check said ID number; and

only if the user selects loan using said input means, the total or a part of said sum to be paid is stored as the sum of a loan in said loan information storage.

18. An electronic purse loan system according to Claim 16, wherein:

if the sum of a loan is already stored in said loan information storage, said terminal subtracts electronic money information equivalent to said sum of the loan from data stored in said sum information storage of said IC card using said IC card reading/writing means; and

then, said terminal subtracts electronic money information equivalent to said charge to be paid from data stored in said sum information storage.

Abstract of the Disclosure

When the sum of the former loan of the user of an IC card and others are written to a personal information storage provided to a center and the IC card is inserted into the slot of an electronic purse terminal at the time of the next transaction, the sum of the loan stored in the personal information storage is cleared and this loan is paid. At this time, the sum stored in the sum information storage of the IC card is updated by this payment and is stored as the balance in the sum information storage. If the balance is more than the charge for a transaction, the transaction comes into effect and if the balance is less than the charge for the transaction and is short, the transaction is performed by having a new loan. The sum of this loan is stored in the personal information storage in the center. As described above, the suspension of a transaction due to the shortage of a balance can be avoided by providing a function for loan to an electronic purse system.

FIG. 1

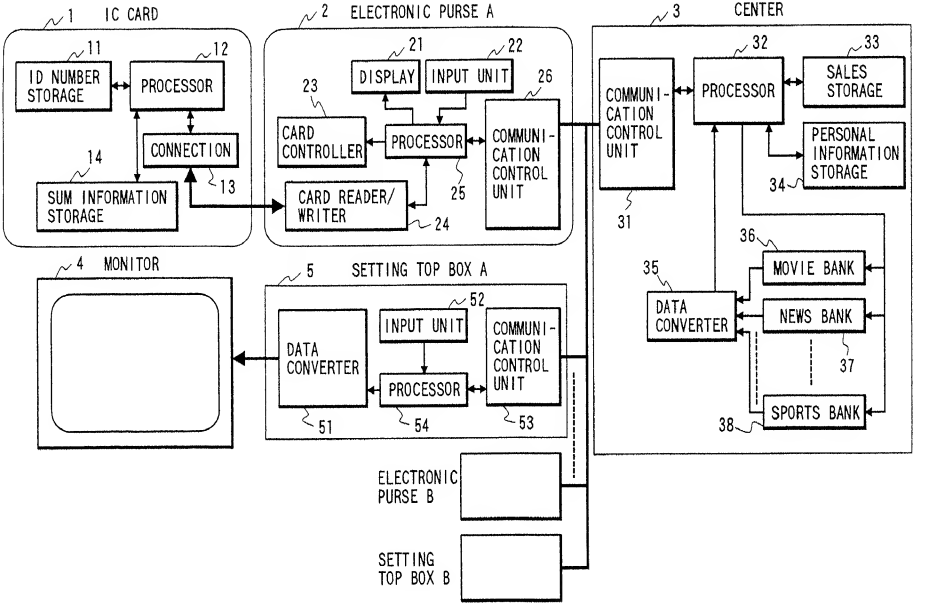

1 IC CARD
11 ID NUMBER STORAGE
12 PROCESSOR
CONNECTION
13
14 SUM INFORMATION STORAGE
2 ELECTRONIC PURSE A
21 DISPLAY
22 INPUT UNIT
23 CARD CONTROLLER
PROCESSOR
25
26 COMMUNICATION CONTROL UNIT
CARD READER/WRITER
24
3 CENTER
COMMUNICATION CONTROL UNIT
31
32 PROCESSOR
33 SALES STORAGE
PERSONAL INFORMATION STORAGE
34
36
MOVIE BANK
35 DATA CONVERTER
NEWS BANK
37
SPORTS BANK
38
4 MONITOR
5 SETTING TOP BOX A
52 INPUT UNIT
DATA CONVERTER
PROCESSOR
COMMUNICATION CONTROL UNIT
51
54
53
ELECTRONIC PURSE B
SETTING TOP BOX B

FIG. 2(a)

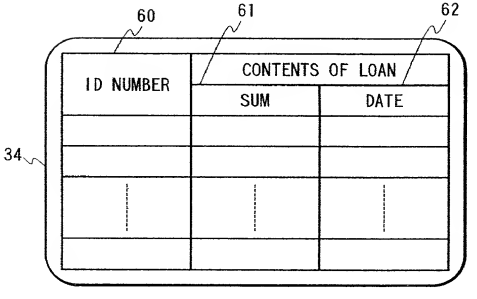

60
61
62
ID NUMBER
CONTENTS OF LOAN
SUM
DATE
34

FIG. 2(b)

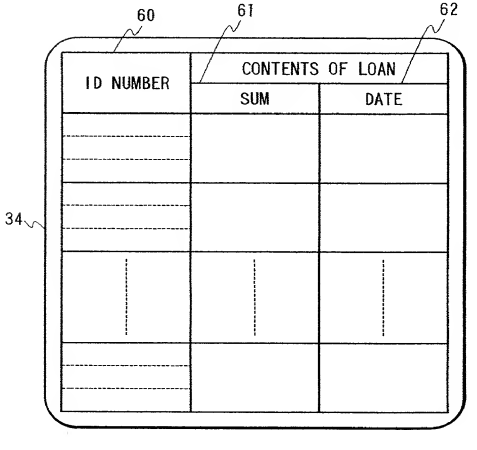

60
61
62
ID NUMBER
CONTENTS OF LOAN
SUM
DATE
34

FIG. 3

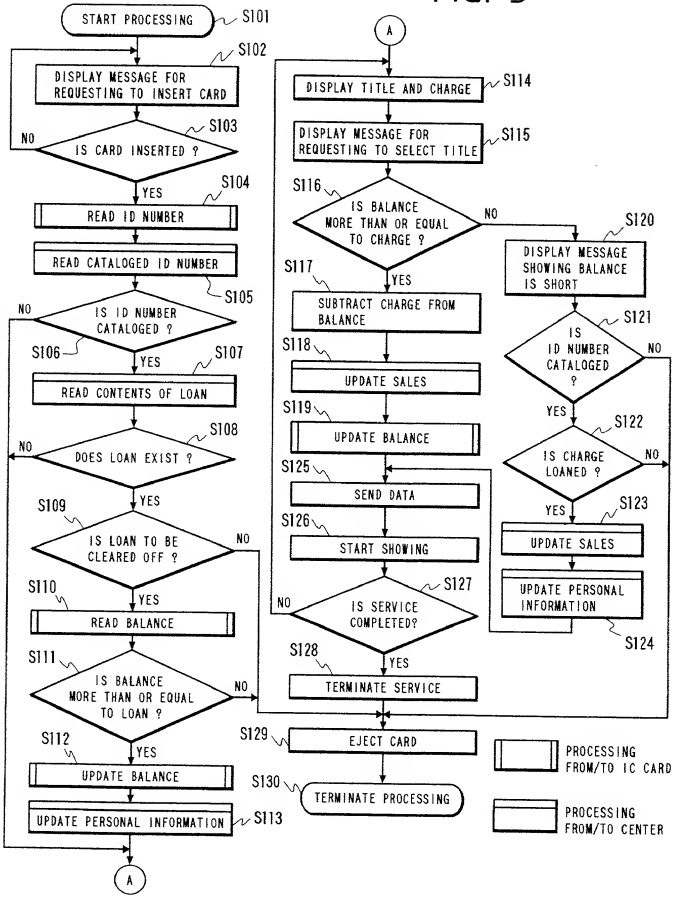

START PROCESSING
S101
DISPLAY MESSAGE FOR REQUESTING TO INSERT CARD
S102
IS CARD INSERTED ?
S103
NO
YES
READ ID NUMBER
S104
READ CATALOGED ID NUMBER
S105
IS ID NUMBER CATALOGED ?
NO
S106
YES
READ CONTENTS OF LOAN
S107
DOES LOAN EXIST ?
S108
NO
YES
IS LOAN TO BE CLEARED OFF ?
S109
NO
YES
READ BALANCE
S110
IS BALANCE MORE THAN OR EQUAL TO LOAN ?
S111
NO
YES
UPDATE BALANCE
S112
UPDATE PERSONAL INFORMATION
S113
A
A
DISPLAY TITLE AND CHARGE
S114
DISPLAY MESSAGE FOR REQUESTING TO SELECT TITLE
S115
IS BALANCE MORE THAN OR EQUAL TO CHARGE ?
S116
NO
YES
SUBTRACT CHARGE FROM BALANCE
S117
UPDATE SALES
S118
UPDATE BALANCE
S119
SEND DATA
S125
START SHOWING
S126
IS SERVICE COMPLETED?
S127
NO
YES
TERMINATE SERVICE
S128
EJECT CARD
S129
TERMINATE PROCESSING
S130
DISPLAY MESSAGE SHOWING BALANCE IS SHORT
S120
IS ID NUMBER CATALOGED ?
S121
NO
YES
IS CHARGE LOANED ?
S122
NO
YES
UPDATE SALES
S123
UPDATE PERSONAL INFORMATION
S124
PROCESSING FROM/TO IC CARD
PROCESSING FROM/TO CENTER

FIG. 4

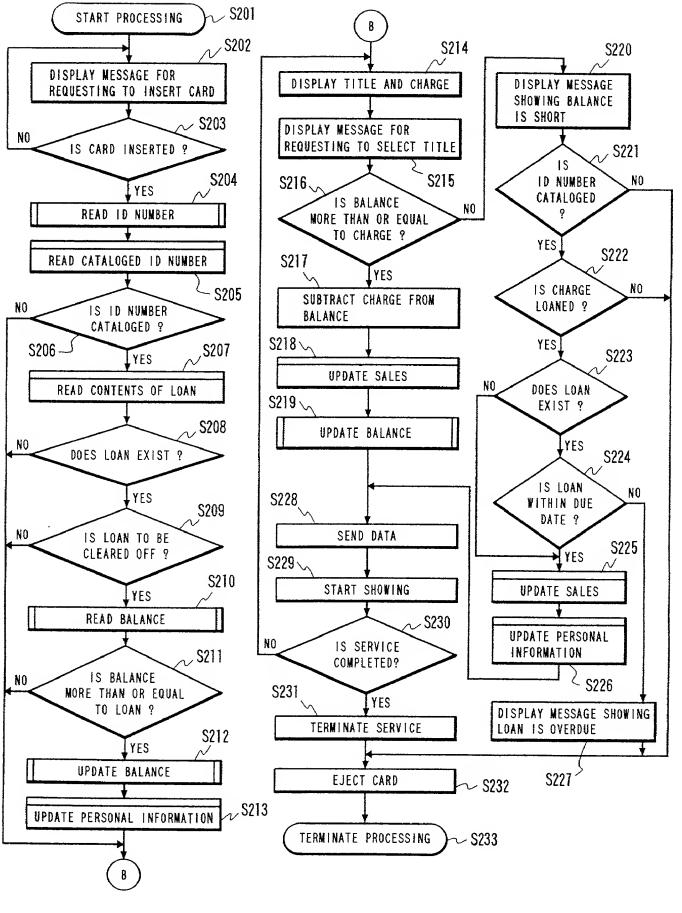

START PROCESSING
S201
DISPLAY MESSAGE FOR REQUESTING TO INSERT CARD
S202
IS CARD INSERTED ?
S203
NO
YES
READ ID NUMBER
S204
READ CATALOGED ID NUMBER
S205
IS ID NUMBER CATALOGED ?
S206
NO
YES
READ CONTENTS OF LOAN
S207
DOES LOAN EXIST ?
S208
NO
YES
IS LOAN TO BE CLEARED OFF ?
S209
NO
YES
READ BALANCE
S210
IS BALANCE MORE THAN OR EQUAL TO LOAN ?
S211
NO
YES
UPDATE BALANCE
S212
UPDATE PERSONAL INFORMATION
S213
B
B
DISPLAY TITLE AND CHARGE
S214
DISPLAY MESSAGE FOR REQUESTING TO SELECT TITLE
S215
IS BALANCE MORE THAN OR EQUAL TO CHARGE ?
S216
NO
YES
SUBTRACT CHARGE FROM BALANCE
S217
UPDATE SALES
S218
UPDATE BALANCE
S219
SEND DATA
S228
START SHOWING
S229
IS SERVICE COMPLETED?
S230
NO
YES
TERMINATE SERVICE
S231
EJECT CARD
S232
TERMINATE PROCESSING
S233
DISPLAY MESSAGE SHOWING BALANCE IS SHORT
S220
IS ID NUMBER CATALOGED ?
S221
NO
YES
IS CHARGE LOANED ?
S222
NO
YES
DOES LOAN EXIST ?
S223
NO
YES
IS LOAN WITHIN DUE DATE ?
S224
NO
YES
UPDATE SALES
S225
UPDATE PERSONAL INFORMATION
S226
DISPLAY MESSAGE SHOWING LOAN IS OVERDUE
S227

FIG. 5

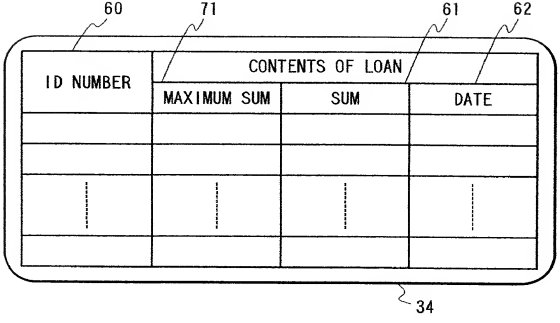

60
71
61
62
ID NUMBER
CONTENTS OF LOAN
MAXIMUM SUM
SUM
DATE
34

FIG. 10

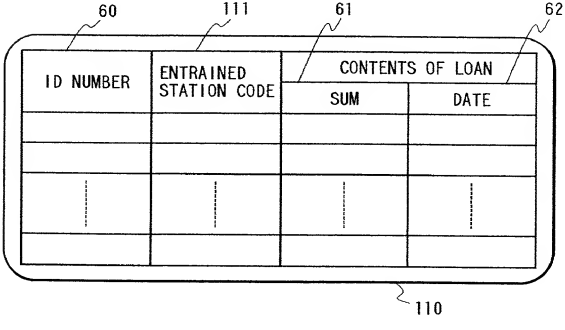

60
111
61
62
ID NUMBER
ENTRAINED STATION CODE
CONTENTS OF LOAN
SUM
DATE
110

FIG. 6

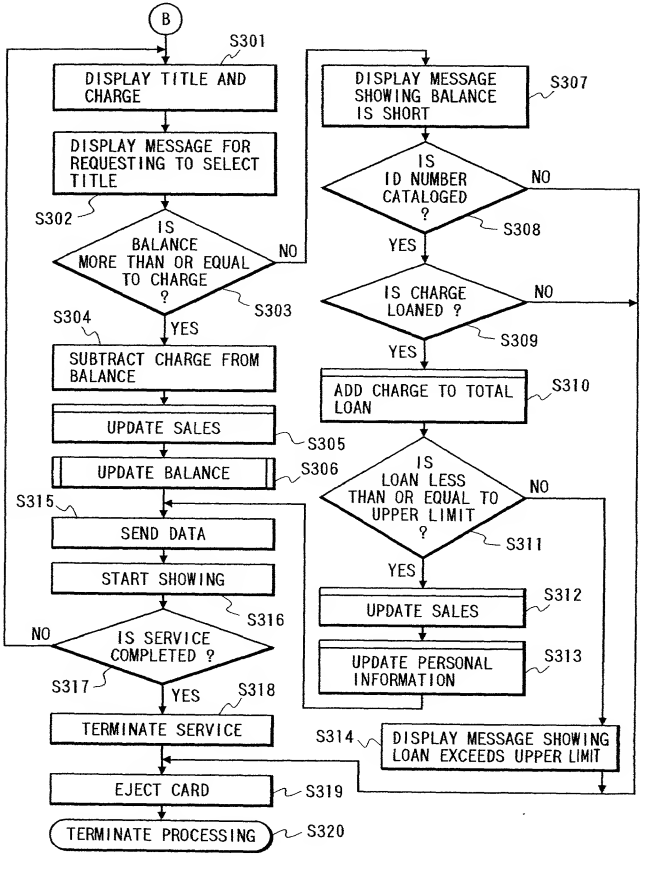

B
S301
DISPLAY TITLE AND CHARGE
DISPLAY MESSAGE FOR REQUESTING TO SELECT TITLE
S302
IS BALANCE MORE THAN OR EQUAL TO CHARGE ?
S303
NO
YES
S304
SUBTRACT CHARGE FROM BALANCE
UPDATE SALES
S305
UPDATE BALANCE
S306
S315
SEND DATA
START SHOWING
S316
NO
IS SERVICE COMPLETED ?
S317
YES
S318
TERMINATE SERVICE
EJECT CARD
S319
TERMINATE PROCESSING
S320
DISPLAY MESSAGE SHOWING BALANCE IS SHORT
S307
IS ID NUMBER CATALOGED ?
S308
NO
YES
IS CHARGE LOANED ?
S309
NO
YES
ADD CHARGE TO TOTAL LOAN
S310
IS LOAN LESS THAN OR EQUAL TO UPPER LIMIT ?
S311
NO
YES
UPDATE SALES
S312
UPDATE PERSONAL INFORMATION
S313
S314
DISPLAY MESSAGE SHOWING LOAN EXCEEDS UPPER LIMIT

FIG. 7

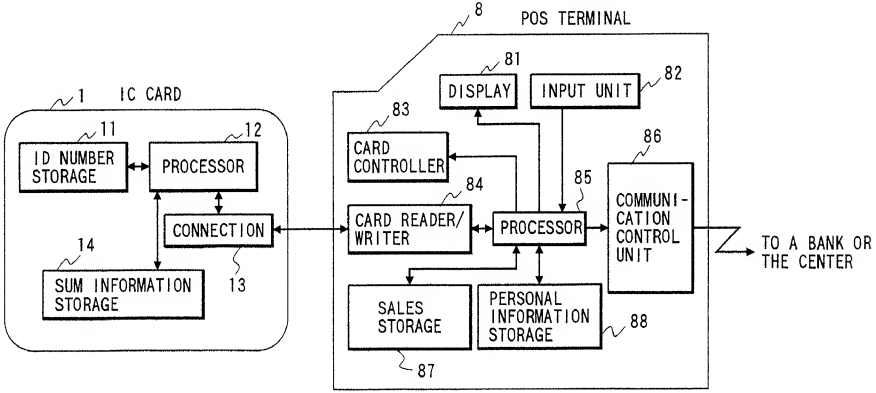


FIG. 8

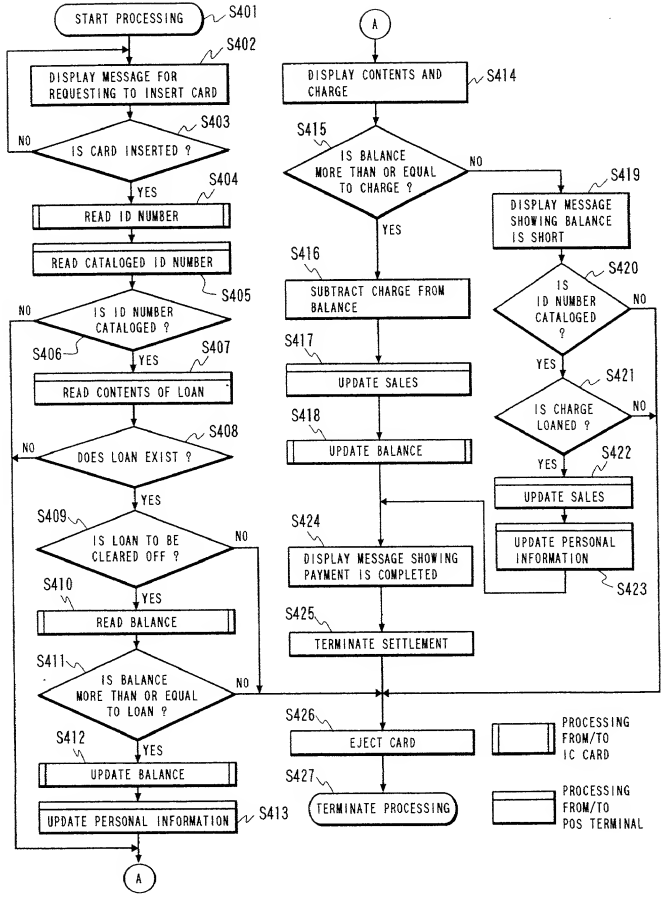

START PROCESSING
S401
S402
DISPLAY MESSAGE FOR REQUESTING TO INSERT CARD
S403
IS CARD INSERTED ?
NO
YES
S404
READ ID NUMBER
READ CATALOGED ID NUMBER
S405
IS ID NUMBER CATALOGED ?
NO
S406
YES
S407
READ CONTENTS OF LOAN
S408
DOES LOAN EXIST ?
NO
YES
S409
IS LOAN TO BE CLEARED OFF ?
NO
YES
S410
READ BALANCE
S411
IS BALANCE MORE THAN OR EQUAL TO LOAN ?
NO
S412
YES
UPDATE BALANCE
UPDATE PERSONAL INFORMATION
S413
A
A
DISPLAY CONTENTS AND CHARGE
S414
S415
IS BALANCE MORE THAN OR EQUAL TO CHARGE ?
NO
YES
S416
SUBTRACT CHARGE FROM BALANCE
S417
UPDATE SALES
S418
UPDATE BALANCE
S424
DISPLAY MESSAGE SHOWING PAYMENT IS COMPLETED
S425
TERMINATE SETTLEMENT
S426
EJECT CARD
S427
TERMINATE PROCESSING
S419
DISPLAY MESSAGE SHOWING BALANCE IS SHORT
S420
IS ID NUMBER CATALOGED ?
NO
YES
S421
IS CHARGE LOANED ?
NO
YES
S422
UPDATE SALES
UPDATE PERSONAL INFORMATION
S423
PROCESSING FROM/TO IC CARD
PROCESSING FROM/TO POS TERMINAL

FIG. 9

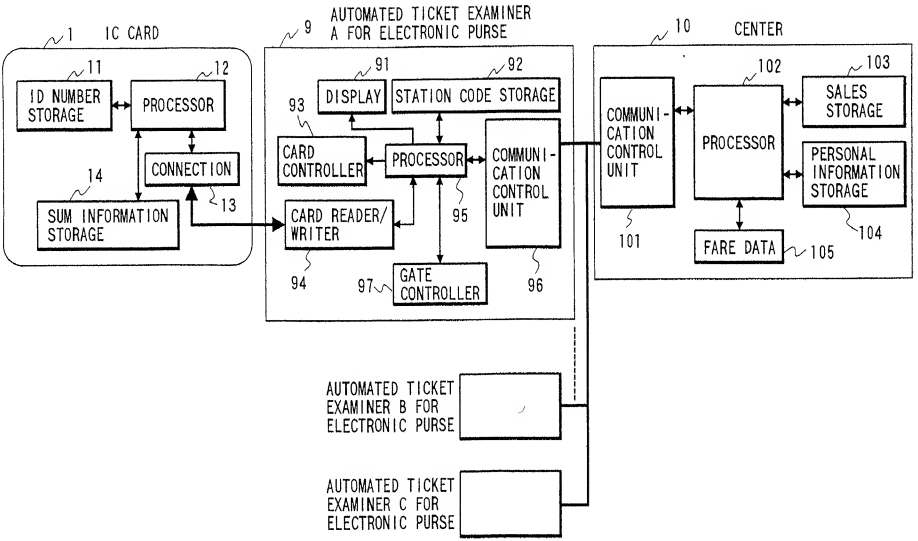

1 IC CARD
11 ID NUMBER STORAGE
12 PROCESSOR
13 CONNECTION
14 SUM INFORMATION STORAGE
9 AUTOMATED TICKET EXAMINER A FOR ELECTRONIC PURSE
91 DISPLAY
92 STATION CODE STORAGE
93 CARD CONTROLLER
PROCESSOR
COMMUNI-CATION CONTROL UNIT
95
CARD READER/ WRITER
94
97 GATE CONTROLLER
96
10 CENTER
COMMUNI-CATION CONTROL UNIT
101
102 PROCESSOR
103 SALES STORAGE
PERSONAL INFORMATION STORAGE
104
FARE DATA
105
AUTOMATED TICKET EXAMINER B FOR ELECTRONIC PURSE
AUTOMATED TICKET EXAMINER C FOR ELECTRONIC PURSE

FIG. 11

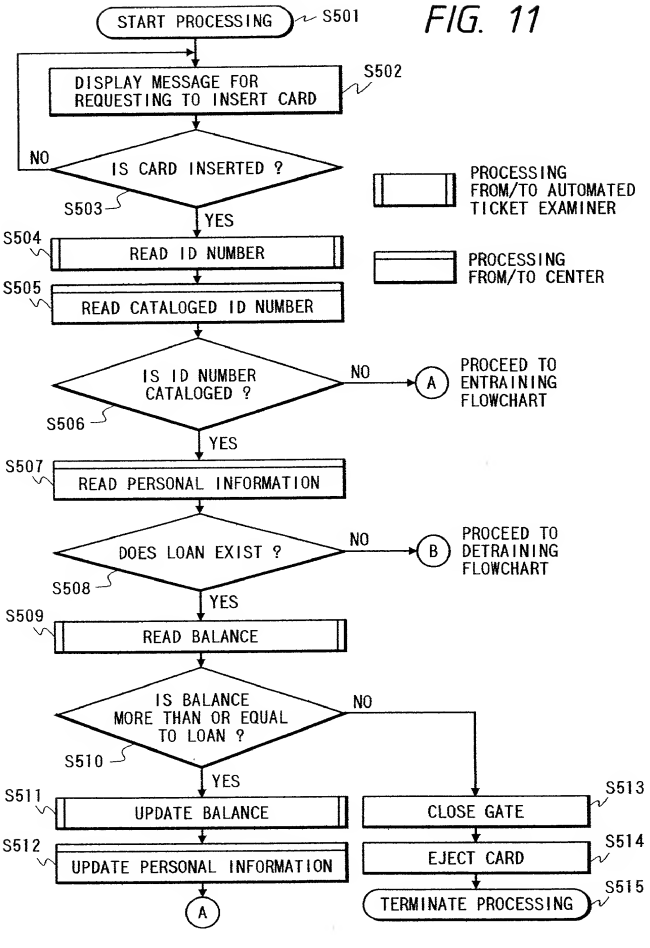

START PROCESSING
S501
DISPLAY MESSAGE FOR REQUESTING TO INSERT CARD
S502
IS CARD INSERTED ?
NO
S503
YES
PROCESSING FROM/TO AUTOMATED TICKET EXAMINER
PROCESSING FROM/TO CENTER
S504
READ ID NUMBER
S505
READ CATALOGED ID NUMBER
IS ID NUMBER CATALOGED ?
NO
A
PROCEED TO ENTRAINING FLOWCHART
S506
YES
S507
READ PERSONAL INFORMATION
DOES LOAN EXIST ?
NO
B
PROCEED TO DETRAINING FLOWCHART
S508
YES
S509
READ BALANCE
IS BALANCE MORE THAN OR EQUAL TO LOAN ?
NO
S510
YES
S511
UPDATE BALANCE
S512
UPDATE PERSONAL INFORMATION
A
CLOSE GATE
S513
EJECT CARD
S514
TERMINATE PROCESSING
S515

FIG. 12(a)

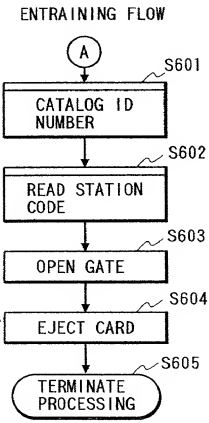


FIG. 12(b)

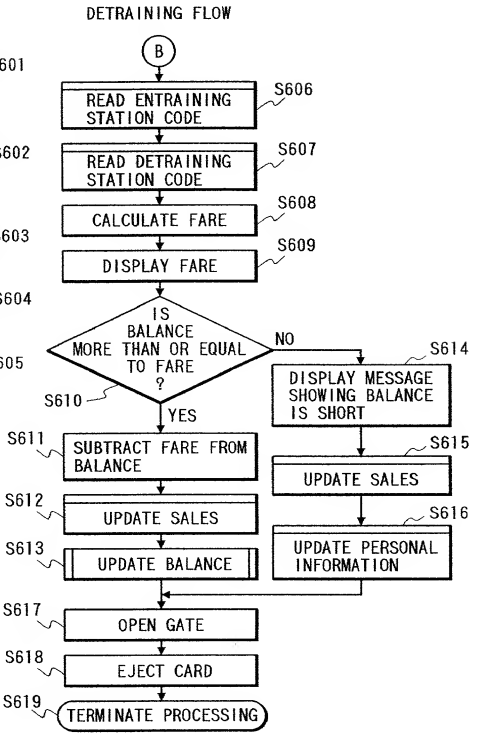
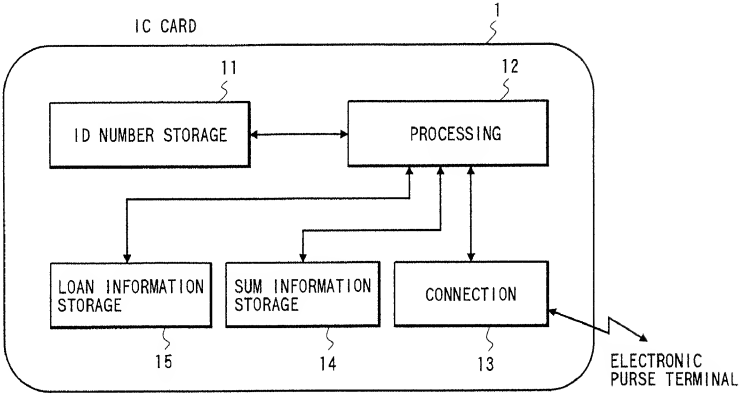


FIG. 13


IC CARD
1
11
12
ID NUMBER STORAGE
PROCESSING
LOAN INFORMATION STORAGE
SUM INFORMATION STORAGE
CONNECTION
15
14
13
ELECTRONIC PURSE TERMINAL